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# BIRD-BANDING

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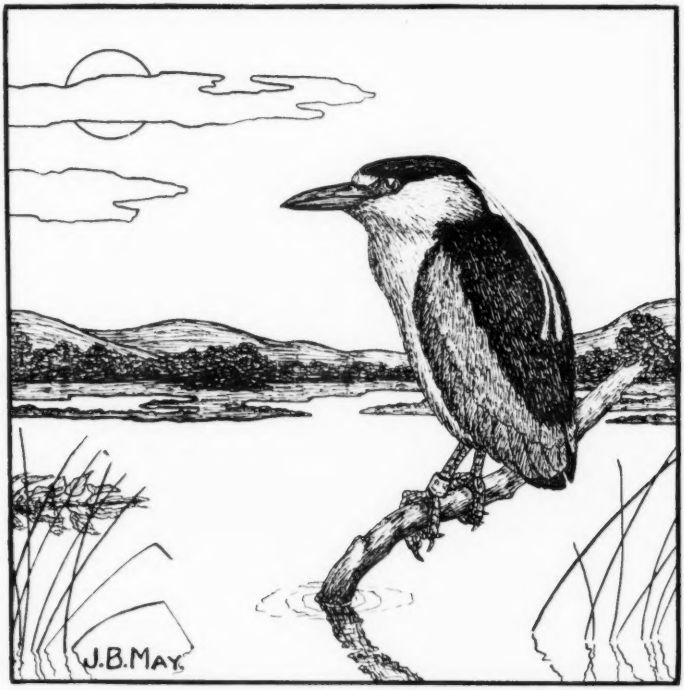


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BIRD-BANDING

A JOURNAL OF ORNITHOLOGICAL INVESTIGATION

VOL. IV APRIL, 1933 NO. 2

# METHODS OF CAPTURING BIRDS AT THE ORNITHOLOGICAL STATION OF CASTEL FUSANO, ITALY.[1]

BY FRANCESCO CHIGI

THE Italian Ornithological Observatories, although established comparatively recently, have already ringed noteworthy numbers of birds, besides serving as centers for the recovery of rings placed on migratory birds in other countries. Italian stations differ from others in that they capture birds with nets and special methods of decoy, already used for centuries in Italy, where the art of bird-catching, now much limited by rigorous laws, was much in vogue in the past.

For taking birds in nets special skill is necessary, besides a knowledge of the habits of the different species, hence only the most expert bird-catchers are able to use nets with the maximum of efficiency.

Two principal types of nets are used—the simple, movable net, the purpose of which is merely to cover and hold the bird on the ground, and the fixed trammel net. The latter consists of a rather fine cotton net with meshes 2½ to 3½ centimeters wide, contained between two other nets of rather strong cotton with meshes about ten times as large. The inner net has a larger surface than the others, but the sides of all three coincide. The inner net must be loose, for otherwise it would not form a pocket in which the bird remains prisoner, when, flying into the middle net, it draws it through one of the large meshes and is held fast.

The Station of Castel Fusano[2] was founded in 1930 through the initiative of the National Fascist Federation of Italian Sportsmen in coöperation with the Institute of Zoölogy of the Royal University of Rome, and is under the control of the Minister of Agriculture and Forests. The personnel occupy

[1] Translated from the Italian by Margaret Morse Nice.

[2] Castel Fusano the country seat of Prince Chigi, is a mile or two from that part of the Mediterranean known as the Tyrrhenian Sea and is about fifteen miles from Rome.

themselves alternately on the shores of the Tyrrhenian Sea with the taking of Quail, and inland with the capture of birds of the woods and fields, using three different methods and working in three different environments. In early summer they devote themselves to the search for nests, the study of nesting, and the ringing of nestlings. Little is done in late summer, but complete inactivity—i.e. of field work, for that of the writing-desk never exists—lasts only from the end of July to the beginning of October.

*The Boschetto.* With the coming in the fall of the first Redbreasts (*Erithacus rubecula* L.) and the first bands of Wood Pigeons (*Columba palumbus* L.) the *boschetto* (little grove) is made ready—a type of place used everywhere in Umbria for the capture of woods birds in general and especially of Thrushes (*Turdus philomelus* Brehm, *Turdus muscius* L.) and Blackbirds (*Turdus merula* L.). The boschetto of Castel Fusano is situated in scrubby growth on the borders of the pine woods about two kilometers from the sea. The evergreen shrubs (*Quercus Ilex* L., *Phillyrea angustifolia* L., *Arbutus Unedo* L., *Juniperus phœnicea* L., *Juniperus communis* L., etc.) form a kind of hedge and are clipped in a special way so that when the birds alight they entangle themselves in the nets hidden there. The trammel nets, two meters in height, are concealed in corridors and galleries made in the line of shrubs. At the strategic center of the *boschetto* a little cabin of greenery is constructed; in this the bird-catchers hide.

Outside of the *boschetto* subsidiary nets are placed to take birds that frequent the undergrowth, among them the Woodcock (*Scolopax rusticola* L.).

The first Thrushes and Blackbirds that are caught are placed in small cages and well fed so as to serve as decoys; these help to acquaint the bird-catcher with the approach of migrating birds, and to encourage the latter to descend to the nets of the *boschetto*.

In the early light of dawn the bird-catchers take their posts in the green blind. The Redbreast is the first to awaken with his petulant *chick, chick* that he repeats every instant. There follow immediately the clucking of the Blackbird and some moments later the short, thin, mysterious whistle of the Song Thrush (*Turdus philomelus*). In the mean time a song is heard from the *boschetto*. It is that of the bird-catchers, who imitate the love song of the Thrush with a special kind of metal whistle held between the lips and the teeth. It is a strong, full, insistent song that is heard nowhere else in the woods at this season. The attention of the Thrushes and Blackbirds is aroused;

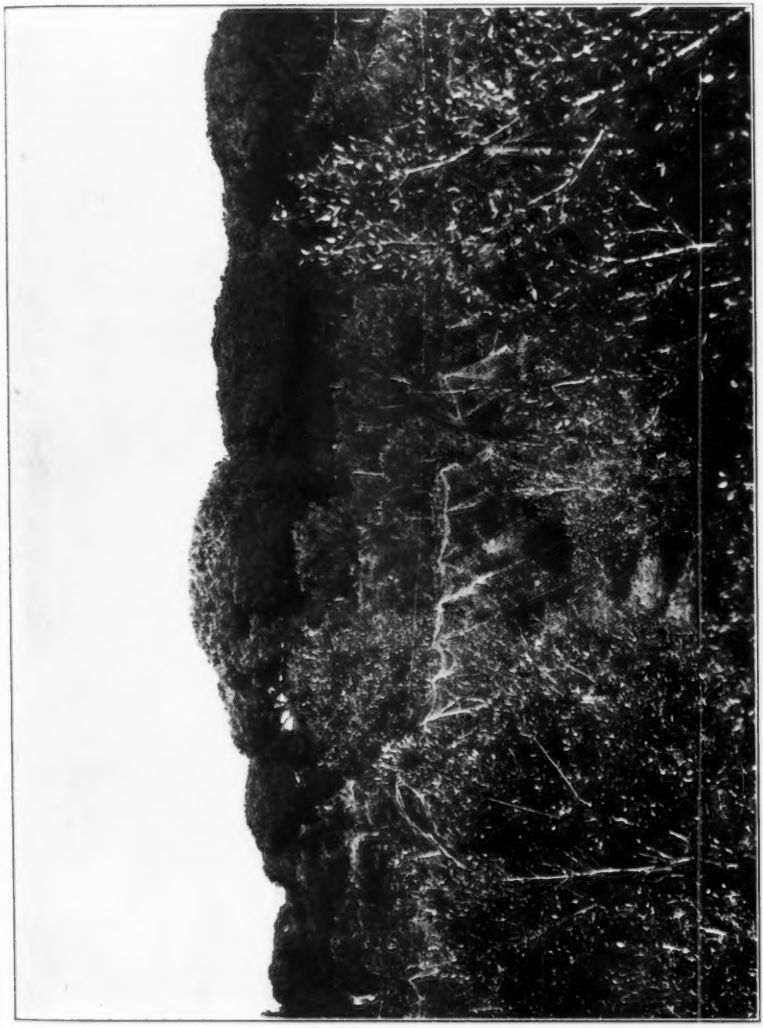

Figure 1. View of the "Boschetto" and Surrounding Woods.

clucking and whistling, they approach and find others of their kind (in the cages) clucking and whistling; they gain more and more confidence and are taken in the nets.

But day draws near rapidly, to the cautious Thrushes that passed the night near the *boschetto* and that have now departed, there succeed bands of migrants in tens, hundreds, and sometimes thousands. Before they are visible to the men, they are perceived by the decoys, which unceasingly give their characteristic call notes, while the bird-catchers continue to imitate the love song of the Thrush. As the birds draw nearer, attracted by the calls and the song, many lower themselves to rest; then the *zi zi zi zi* becomes louder, and they launch themselves like meteors into the *boschetto*. Then a commotion is heard in the nets, often followed by notes of alarm. In such cases it is necessary to run to liberate the prisoner, which might cause his frightened companions to leave, and himself become a victim of the Sparrow Hawk (*Accipiter nisus* L.). And the prisoners pass several hours of the morning in a comfortable willow basket, until they are ringed and liberated.

Not always, however, do the migrating Thrushes listen to the calls of their caged companions or the counterfeit song of the bird-catchers; they often continue their journey with indifference. Then the art of the bird-catcher must be refined. A caged Thrush is held ready for the occasion; and when Thrushes are noted that seem uncertain as to whether or not they will come to the *boschetto*, a stuffed owl is suddenly brought before the Thrush, or even a rag or a hand. The bird gives a cry of alarm and defense—*schiamazza*. At this cry the Thrushes passing above the *boschetto* drop down and are caught. But the Thrush that serves as *schiamazzo* must be well proved; if, instead of a cry of alarm, it gives that of terror, all the other birds will flee precipitously, even those that had had the best of intentions to come into the nets of the *boschetto*.

Sometimes, indeed, the Thrushes are too credulous and come into the blind occupied by the bird-catchers. In our *boschetto* the blind is surrounded by nets.

Although each of the three species—Song Thrush, Blackbird, and Redwing (*Turdus musicus* L.)—has its own call notes and different songs, yet all are attracted by the false song and also, of course, by the calls of the caged birds of any of the three species.

Throughout the autumn and almost all the winter migrating or wandering Song Thrushes, Blackbirds, and Redwings fall into our nets in the *boschetto*. And in the same period many other small woods birds are taken, especially a large number of

Pl. II

Figure 2. The Trammel Net in a Corridor of the "Boschetto."

Redbreasts, which have a great attachment to their chosen winter quarters, as is shown by the numerous recoveries in the same station of ringed birds.

In February and March the winter wandering of the Thrushes and Blackbirds ceases, and the migrating birds, returning to their homes, believe no longer in the decoys, nor do they stop in the forests by the coasts; so the activity of the *boschetto* comes to an end.

The *boschetto* of Castel Fusano uses about 700 meters of nets; there are, besides, 500 meters of auxiliary nets, and half of these are four meters in height. The bird-catchers are chosen from the best in Umbria for the experience they have had in bird-catching in general and *whistling* in particular.

The *boschetto* of Castel Fusano is protected by more than 2000 hectares (about 5000 acres) of land in which hunting of all small birds, and of Thrushes, Blackbirds, and Redwings is forbidden, while other hunting is limited. In the seasons of 1930–31 and 1931–32 (the last being noteworthy for the abundance of the migration) the complete take was 4000 Thrushes and Blackbirds and about 2500 small birds. In the current year, when the migration was small, only a few more than 1500 Thrushes and Blackbirds were captured.

*Netting of the Quail.* By the end of March activity in the *boschetto* is ended and the work is transferred to the sea-coast for the netting of the Quail (*Coturnix coturnix* L.). This powerful flyer begins to arrive from North Africa on the coast of the Tyrrhenian Sea near the end of February, but at this time there are only a few scattered individuals. Later, towards the middle and end of March, there is a fair flight, and finally the migration becomes regular, occurring nearly every day, with gaps, increases, and decreases in the number of the birds in April, to continue throughout May, part of June, and even in July, according to weather conditions. After days of the heaviest flights when many thousands of Quail land and penetrate into the Italian peninsula, sometimes there will be weeks of no flight or almost none; but the full number of Quail that cross our coast during the course of a season runs into many hundreds of thousands.

The Quail is the only gallinacious migrant of our country and has the aspect of a heavy bird little adapted to flight. But appearances are deceptive, for it is now proved that in a few hours it is capable of crossing the Mediterranean and Tyrrhenian Seas from Tunisia to the Roman coast and to pursue the journey to the Adriatic across the highest part of the Apennines, departing from the Tyrrhenian coast the evening

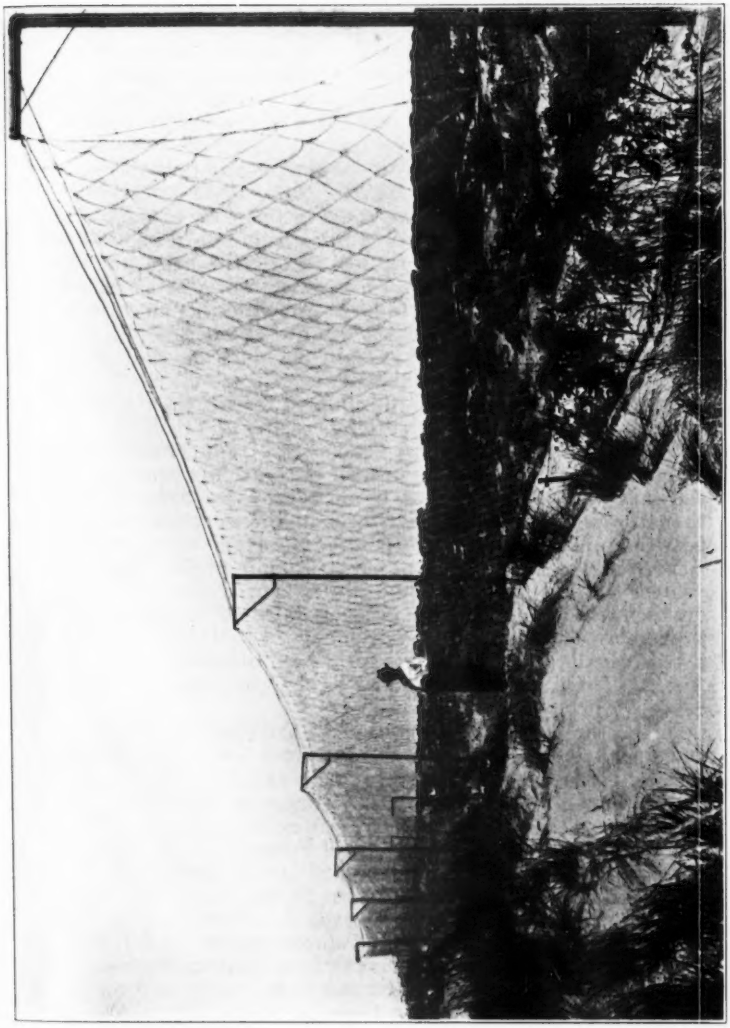

Figure 3. The Trammel Net Shore
on Dunes for the Capture of Migratory Quail.

of the same day as it arrives from Africa, about 800 kilometers (480 miles) of flight in less than 30 hours, without counting any flight in Africa before reaching the Mediterranean coast. And it is certain that no Quail remain on the coast from one day to another, but that all, except those that are injured, are ready to take up their flight after, on an average, twelve hours of rest. Nor can we be sure that this rest is absolutely necessay, since, as these birds travel only by night, the stop is due to the presence of the sun above the horizon and probably only in part to the necessity of repose.

The Quail leave the African coast in the early evening and reach us normally at dawn or a little before until about 9 in the morning, or even later until 3 o'clock. A large number stop on the coast, either on the bare sand or where there is sufficient vegetation to give them shelter; another portion fly without stopping towards the interior of the peninsula. The birds arrive with a very rapid flight, so much so, that often, alighting on the bare sand, they spin for some meters before they can recover their equilibrium, and then run quickly towards some tuft of grass that offers shelter and food.

For capturing the Quail we use vertical trammel nets three meters high, set up on the crest of natural dunes parallel to the seashore. Many escape because they are flying higher than the nets, or by passing through the very small space between the lower edge of the net and the earth.

The length of the principal nets, situated on the first dune nearest the sea, is 400 meters. Other nets are set up on the dunes farther from the sea, either parallel or obliquely, and these serve sometimes for the catching of Quail that are flying toward the interior, sometimes for other birds migrating from Africa. There are about 500 meters of these lower subsidiary nets.

In the three seasons the station on the coast has captured and ringed about 1200 Quail besides about 1000 birds of other species. It is remarkable that in June and July many young Quail arrive not fully grown and with one or two primaries in molt; these were hatched in North Africa in early spring.

*The Field Birds.* Between Castel Fusano and the borough of Ostia Antica clap nets are installed for the capture of Lapwings (*Vanellus vanellus* L.), Golden Plover (*Charadrius apricarius* L.), Ruffs (*Philomachus pugnax* L.), Stock Doves (*Columba œnas* L.), Wood Pigeons (*Columba palumbus* L.), Starlings (*Sturnus vulgaris* L.) and sometimes small passerines.

The nets, one-ply and rectangular in form, are laid on the ground in pairs with a space between them. By means of

planting sticks and pull-lines, the nets are pulled over in such a way that one overlaps the other. In the free space between the two nets decoys are mounted of the species one wishes to catch, usually made with skins stuffed with straw or hay or stretched on cork models; these are placed with the beak to the wind. Live decoys are used for doves and also for shore-birds; with a simple contrivance they are caused to move at the opportune moment.

Like other forms of bird-catching, this also calls for much professional skill in the operator. He must know to perfection the habits of the birds he wishes to catch, to foresee their intentions, to be able at the opportune moment, neither too early nor too late, to bring the decoys into play, to imitate the call-notes of the birds that pass, and to be able to choose the proper instant for drawing the nets and taking, either on the wing or on the ground, the largest possible number of birds at one time. Removing the birds from the horizontal nets is no easy matter; skill and dexterity are needed, especially when Starlings, comparatively small birds and very quick to escape are caught in the nets with relatively large meshes designed for Lapwings.

In two years there have been taken in these nets about 300 Lapwings, 100 shore-birds of various species, 200 Doves, and 200 Starlings.

The last form of activity of our station, that of the study of nesting and the ringing of nestlings, begins in April with the first nests of the Blackbird and lasts until July, when the diurnal birds of prey are nesting in numbers. Up to the end of 1932 there have been ringed about 500 Starlings, 300 Blackbirds, and 400 other birds.

Castel Fusano, November, 1932.

# EXTERNAL PARASITES COLLECTED FROM BANDED BIRDS

BY HAROLD S. PETERS

Division of Insects Affecting Man and Animals
United States Bureau of Entomology

ONE of the interesting and important phases of bird-banding is the study of the external parasites found on many birds. Banders are giving increasing attention to the study and collection of the lice, flies, ticks, and mites which may be present on the birds they handle. Since most of these parasites must be detrimental to their host, a knowledge of their presence and abundance may enable us to explain some of the peculiar records obtained in banding.

In connection with the writer's work on insects and related forms affecting birds many external parasites have been sent in by banders during the past four or five years. In many cases valuable information concerning abundance and distribution accompanied the specimens. From this material the following list of 54 species of parasites, taken from 75 species of birds, has been compiled. No attempt has been made to indicate the number of individual birds which were examined and found parasitized, as the data from different banders could hardly be compared, owing to individual differences in the method and thoroughness of examination. It is sometimes very difficult to find these parasites on live birds, owing to the small size and rapid movement of some as well as to the natural nervousness of the bird in the hand. They may be picked from the bird with a pair of small tweezers or forceps.

On practically every bird there are one or more species of external parasites. It is possible to find several different kinds of lice on any bird species. Two kinds of bird flies are commonly found on passerine birds. One or two species of ticks may be found on ground-feeding birds. Mites are found on most bird species. It is very important to examine the entire body of the bird, as different groups of parasites are found on different parts of the bird's body.

Parasites found most commonly on birds are the lice, or Mallophaga, of which 41 species are here recorded from banded birds. The lice have biting mouth parts, feed on parts of the feathers and scales of the skin, and cause much irritation by their sharp claws. Different genera of lice are found on different parts of the bird. Lice of the genus *Philopterus* are slow,

clumsy forms found on the feathers of the head, neck, and throat. Those of the genus *Degeeriella* are found on the breast and back feathers. Lice of the genera *Menacanthus*, *Myrsidea*, and *Ricinus* are all rapid-running forms found among the breast and back feathers. The same species of lice are often found on closely related birds. Thus on many passerine birds *Degeeriella vulgata*, *Menacanthus chrysophæum*, *Myrsidea incerta*, and *Philopterus subflavescens* may be found. It will be noted that these four lice are reported on many species of birds in this list.

The bird flies, belonging to the family Hippoboscidae of the order Diptera, have sucking mouth parts and feed on the blood of many different kinds of birds. They are represented by only three species in this list. Two species are recorded from many passerine birds; the small bird fly, *Ornithoica confluens*, from 22 species of birds, and the large bird fly, *Ornithomyia avicularia*, from 23 species. They are often very difficult to capture, as they fly quickly from the feathers when the bird is picked up.

In the material received the ticks are represented by only two species. The common rabbit tick, *Hæmaphysalis leporispalustris*, was found on 15 kinds of birds, principally the ground feeders. Since ticks have sucking mouth parts, they may transmit blood-borne diseases such as tularemia, commonly carried by the rabbit tick. *Ixodes brunneus*, which feeds only on birds, was found on nine species.

The mites are very common on birds but are frequently overlooked because of their small size. The feather mites, *Analges*, *Analgopsis*, and *Proctophyllodes*, are found on the wing feathers as well as on the breast and back feathers. The northern fowl mite, *Liponyssus sylviarum*, has been found on 11 species of birds and the common chicken mite, *Dermanyssus gallinæ*, on three. These two mites are very injurious to domestic poultry and may be spread by wild birds. Three species of chiggers, *Trombicula*, are recorded. Birds are probably a factor in the distribution of the common chigger affecting man, and suffer from its attack.

Probably the most important groups of external parasites are the bird flies, the ticks, and the mites. They all suck blood, and in addition to the damage done directly to their hosts by feeding they may act as disease-carriers. Many of the members of these groups move from one bird to another, whereas the lice remain on the body of one host throughout their life. The complete life cycle of many of these parasites, especially that of the bird flies and feather mites, is not known, and banders may be able to assist in extending our knowledge of this subject.

This list of parasites from banded birds has been made up mainly from specimens sent in by banders in the eastern part of the United States. Their assistance and interest are gratefully acknowledged, and the writer wishes to thank them for their help in his study of these ectoparasites. Those banders whose material has been used in this list are as follows:

1. Austin Ornithological Research Station, North Eastham, Mass.
2. Baldwin Bird Research Laboratory, Gates Mills, Ohio.
3. Mrs. M. V. Beals, Elmhurst, Long Island, N. Y.
4. O. M. Bryens, McMillan, Mich.
5. F. M. Carroll, New Orleans, La.
6. Mrs. W. H. Edwards, Fairhope, Ala.
7. E. C. Hoffman, Lakewood, Ohio.
8. Miss G. C. Meleney, Oak Bluffs, Mass., and (8a) White Plains, N. Y.
9. Mrs. M. M. Nice, Columbus, Ohio.
10. H. S. Peters, Silver Spring, Md.
11. L. O. Shelley, East Westmoreland, N. H.
12. D. Smiley, Jr., Mohonk Lake, N. Y.
13. W. P. Smith, Wells River, Vt.
14. P. A. Stewart, Leetonia, Ohio.
15. W. B. Taber, Jr., Kansas, Ill.
16. I. R. Tomkins, Savannah, Ga.
17. Mrs. K. B. Wetherbee, Worcester, Mass., and Pomfret, Conn.
18a. W. P. Wharton, Groton, Mass., and (18b) Summerville, S. C.
19. C. L. Whittle, Peterboro, N. H.

## LIST OF HOSTS AND THE PARASITES COLLECTED FROM EACH.[1]

Eastern Brown Pelican, *Pelecanus occidentalis occidentalis* (Linn).
(L) *Tetrophthalmus titan* Piaget, 6
Little Blue Heron, *Florida Cærulea cærulea* Linn.
(F) *Lynchia ardea* (McQ.), 6
Turkey Vulture, *Cathartes aura septentrionalis* Wied.
(L) *Ferrisia kelloggi* (Osborn), 15
Black Vulture, *Coragyps atratus atratus* (Meyer).
(L) *Cuculiphilus alternatum* (Osborn), 6
(L) *Esthiopterum marginale* (Osborn), 6
(L) *Ferrisia kelloggi* (Osborn), 6
Eastern Bobwhite, *Colinus virginianus virginianus* (Linn.).
(L) *Goniodes ortygis* Denny, 9
King Rail, *Rallus elegans elegans* Audubon.
(L) *Pseudomenopon tridens* (Nitzsch), 6
(L) *Rallicola bisetosa* (Piaget), 6
White-rumped Sandpiper, *Pisobia fuscicollis* (Vieillot).
(L) *Actornithophilus minus* (Kellogg & Chapman), 1
(L) *Degeeriella actophila* (Kell. & Chap.), 1
(L) *Degeeriella complexiva* (Kell. & Chap.), 1

[1]The writer wishes to acknowledge the assistance of the following specialists who determined the material in this list: flies by Dr. J. M. Aldrich of the National Museum; ticks by Dr. F. C. Bishopp of the Bureau of Entomology; and mites by Dr. H. E. Ewing of the Bureau of Entomology. The lice were determined by the writer. The lice are designated by (L), the flies by (F), the ticks by (T), and the mites by (M). The numbers following the names of the parasites refer to the individual banders as listed above, and also indicate the localities where the collections were made.

Red-backed Sandpiper, *Pelidna alpina sakhalina* (Vieillot).
(L) *Actornithophilus minus* (Kell. & Chap.), 1
(L) *Degeeriella actophila* (Kell. & Chap.), 1
(L) *Degeeriella complexiva* (Kell. & Chap.), 1
(L) *Philopterus* sp., 1
Herring Gull, *Larus argentatus smithsonianus* Coues.
(L) *Philopterus gonothorax* (Giebel), 1
Laughing Gull, *Larus atricilla* Linn.
(L) *Philopterus gonothorax* (Giebel), 5
Least Tern, *Sterna antillarum antillarum* (Lesson).
(L) *Degeeriella* sp., 5
(L) *Philopterus melanocephalus* (Nitzsch), 5
Royal Tern, *Thalasseus maximus maximus* (Boddaert).
(L) *Philopterus melanocephalus* (Nitzsch), 16
Black Skimmer, *Rynchops nigra nigra* Linn.
(L) *Philopterus* sp., 5
(L) *Philopterus elongatus* (Piaget), 5
Eastern Mourning Dove, *Zenaidura macroura carolinensis* (Linn.).
(L) *Columbicola columbæ* (Linn.), 2, 15
Chimney Swift, *Chætura pelagica* (Linn.).
(L) *Dennyus dubius* (Kell.), 1, 12, 14
Northern Downy Woodpecker, *Dryobates pubescens medianus* (Swainson).
(L) *Philopterus californiensis* (Kell.), 2
(F) *Ornithoica confluens* Say, 11
Northern Crested Flycatcher, *Myiarchus crinitus boreus* (Banga).
(M) *Liponyssus sylviarum* (C. & F.), 6
Eastern Phœbe, *Sayornis phœbe* (Latham).
(M) *Liponyssus sylviarum* (C. & F.), 14
Prairie Horned Lark, *Otocoris alpestris praticola* Henshaw.
(L) *Philopterus subflavescens* (Geof.), 4
Tree Swallow, *Iridoprocne bicolor* (Vieillot).
(L) *Degeeriella longa* (Kell.), 4
(L) *Myrsidea dissimilis* (Kell.), 4
(L) *Philopterus domesticus* (Kell.), 4
Barn Swallow, *Hirundo erythrogaster* Boddaert.
(M) *Dermanyssus gallinæ* (Degeer), 4, 8
(M) *Liponyssus sylviarum* (C. & F.), 13, 14
Purple Martin, *Progne subis subis* Linn.
(L) *Myrsidea dissimilis* (Kell.), 4
(M) *Dermanyssus gallinæ* (Degeer), 6
Northern Blue Jay, *Cyanocitta cristata cristata* (Linn.).
(L) *Menacanthus persignatus* (Kell.), 6
(L) *Myrsidea funerea* (Kell. & Chap.), 6
(L) *Philopterus cristata* Malcomson, 6, 18b
(F) *Ornithoica confluens* Say, 10
Black-capped Chickadee, *Penthestes atricapillus atricapillus* Linn.
(L) *Ricinus* sp., 2
(F) *Ornithoica confluens* Say, 8
Tufted Titmouse, *Baeolophus bicolor* (Linn.).
(L) *Myrsidea incerta* (Kell.), 18b.
White-breasted Nuthatch, *Sitta carolinensis carolinensis* Latham.
(F) *Ornithoica confluens* Say, 11
(F) *Ornithomyia avicularia* Linn. 11
Eastern House Wren, *Troglodytes ædon ædon* Vieillot.
(M) *Dermanyssus gallinæ* (Degeer), 17
(M) *Liponyssus sylviarum* (C. & F.), 14

Carolina Wren, *Thryothorus ludovicianus ludovicianus* Latham.
(T) *Hæmaphysalis leporis-palustris* Packard, 18b
Eastern Mockingbird, *Mimus polyglottos polyglottos* (Linn.).
(L) *Degeeriella eustigma* (Kell.), 6, 18b
(L) *Myrsidea incerta* (Kell.) 6
Catbird, *Dumetella carolinensis* (Linn.).
(L) *Myrsidea incerta* (Kell.), 2, 3, 8a, 13 18b
(F) *Ornithomyia avicularia* Linn., 13, 17, 18a
(T) *Hæmaphysalis leporis-palustris* Packard, 18a
(T) *Ixodes brunneus* Koch, 17, 18b
Brown Thrasher, *Toxostoma rufum* (Linn.).
(L) *Myrsidea incerta* (Kell.), 3, 6, 15, 18b
(L) *Philopterus subflavescens* (Geof.), 18b
(F) *Ornithomyia avicularia* Linn., 3
(T) *Hæmaphysalis leporis-palustris* Packard, 18b
(M) *Analgopsis* sp., 2
(M) *Liponyssus sylviarum* (C. & F.), 6
(M) *Trombicula* sp., 6
Eastern Robin, *Turdus migratorius migratorius* Linn.
(L) *Menacanthus chrysophæum* (Kell.), 3
(F) *Ornithoica confluens* Say, 12, 18a
(F) *Ornithomyia avicularia* Linn., 12, 14, 18a
(T) *Ixodes brunneus* Koch, 18 b
(M) *Liponyssus sylviarum* (C. & F.), 12, 14
Wood Thrush, *Hylocichla mustelina* (Gmelin).
(L) *Myrsidea incerta* (Kell.), 3
Eastern Hermit Thrush, *Hylocichla guttata faxoni* Bangs & Penard.
(L) *Degeeriella eustigma* (Kell.), 3
(L) *Myrsidea incerta* (Kell.), 3
(T) *Hæmaphysalis leporis-palustris* Packard, 6, 18a, 18b
(T) *Ixodes brunneus* Koch, 18b
(M) *Trombicula whartoni* Ewing, 18b
Olive-backed Thrush, *Hylocichla ustulata swainsoni* (Tschudi).
(L) *Myrsidea incerta* (Kell.), 3
(T) *Hæmaphysalis leporis-palustris* Packard, 18a
Veery, *Hylocichla fuscescens fuscescens* (Stephens).
(F) *Ornithoica confluens* Say, 17
(F) *Ornithomyia avicularia* Linn., 3, 17
Eastern Bluebird, *Sialia sialis sialis* (Linn.).
(L) *Philopterus sialii* (Osborn), 2
Eastern Ruby-crowned Kinglet, *Corthylio calendula calendula* (Linn.).
(F) *Ornithoica confluens* Say, 18b
Starling, *Sturnus vulgaris vulgaris* Linn.
(L) *Degeeriella nebulosa* (Burmeister), 10
(L) *Menacanthus spinosum* (Piaget), 3, 14
Red-eyed Vireo, *Vireo olivaceus* (Linn.).
(L) *Philopterus subflavescens* (Geof.), 6
(L) *Ricinus* sp., 6
Black and White Warbler, *Mniotilta varia* (Linn.).
(F) *Ornithoica confluens* Say, 18a
Magnolia Warbler, *Dendroica magnolia* (Wilson).
(L) *Myrsidea incerta* (Kell.), 18a
Cape May Warbler, *Dendroica tigrina* (Gmelin).
(L) *Myrsidea incerta* (Kell.), 3

Myrtle Warbler, *Dendroica coronata* (Linn.).
(L) *Degeeriella vulgata* (Kell.), 3
(F) *Ornithoica confluens* Say, 11
(F) *Ornithomyia avicularia* Linn., 3
Chestnut-sided Warbler, *Dendroica pensylvanica* (Linn.).
(L) *Myrsidea incerta* (Kell.), 3
Oven-bird, *Seiurus aurocapillus* (Linn.).
(L) *Menacanthus chrysophæum* (Kell.), 3, 12
(T) *Hæmaphysalis leporis-palustris* Packard, 18a
Northern Water-Thrush, *Seiurus noveboracensis noveboracensis* (Gmelin).
(L) *Menacanthus* sp., 3
(F) *Ornithoica confluens* Say, 11
(F) *Ornithomyia avicularia* Linn., 11
Northern Yellow-throat, *Geothlypis trichas brachidactyla* (Swainson).
(L) *Ricinus pallens* (Kell.), 3
(F) *Ornithomyia avicularia* Linn., 11
Eastern Meadowlark, *Sturnella magna magna* (Linn.).
(L) *Menacanthus chrysophæum* (Kell.) 18b
Eastern Redwing Blackbird, *Agelaius phæniceus phæniceus* Linn.
(L) *Philopterus subflavescens* (Geof.) 18a
(F) *Ornithomyia avicularia* Linn., 17
Baltimore Oriole, *Icterus galbula* (Linn.).
(F) *Ornithomyia avicularia* Linn., 17
Rusty Blackbird, *Euphagus carolinus* (Muller).
(L) *Myrsidea* sp., 14
Purple Grackle, *Quiscalus quiscula quiscula* (Linn.).
(F) *Ornithoica confluens* Say, 8
(F) *Ornithomyia avicularia* Linn., 8
Florida Grackle, *Quiscalus quiscula aglæus* Baird.
(M) *Liponyssus sylviarum* (C. & F.), 6
Bronzed Grackle, *Quiscalus quiscula æneus* Ridgway.
(L) *Menacanthus chrysophæum* Kell., 7, 15
Eastern Cowbird, *Molothrus ater ater* (Boddaert).
(F) *Ornithoica confluens* Say, 8, 19
(F) *Ornithomyia avicularia* Linn., 4, 8, 18a, 19
(T) *Hæmaphysalis leporis-palustris* Packard, 4
(M) *Liponyssus sylviarum* (C. & F.), 18a
Scarlet Tanager, *Piranga erythromelas* Vieillot.
(F) *Ornithomyia avicularia* Linn., 12
Eastern Cardinal, *Richmondena cardinalis cardinalis* (Linn.).
(L) *Myrsidea incerta* (Kell.), 6, 10
(L) *Philopterus subflavescens* (Geof.), 18b
Eastern Purple Finch, *Carpodacus purpureus purpureus* (Gmelin).
(L) *Degeeriella vulgata* (Kell.), 13
(F) *Ornithomyia avicularia* Linn., 19
Eastern Goldfinch, *Spinus tristis tristis* (Linn.).
(T) *Hæmaphysalis leporis-palustris* Packard, 18b
Red-eyed Towhee, *Pipilo erythrophthalmus erythrophthalmus* (Linn.).
(L) *Machærilæmus mæstum* (Kell. & Chap.), 3, 11, 18b
(L) *Myrsidea melanorum* (Kell.), 3, 18b
(F) *Ornithoica confluens* Say, 3, 8
(F) *Ornithomyia avicularia* Linn., 8, 12
(T) *Hæmaphysalis leporis-palustris* Packard, 18b
(T) *Ixodes brunneus* Koch, 18b
White-eyed Towhee, *Pipilo erythrophthalmus alleni* Coues.
(F) *Ornithoica confluens* Say, 18b

Eastern Savannah Sparrow, *Passerculus sandwichensis savanna* (Wilson).
(L) *Ricinus* sp., 4
(F) *Ornithoica confluens* Say, 9
(F) *Ornithomyia avicularia* Linn., 4, 17
(T) *Hæmaphysalis leporis-palustris* Packard, 18a
Eastern Vesper Sparrow, *Poœcetes gramineus gramineus* (Gmelin).
(L) *Macrelæmus mæstum* (Kell. & Chap.), 4
(F) *Ornithomyia avicularia* Linn., 4
Slate-colored Junco, *Junco hyemalis hyemalis* (Linn.).
(L) *Degeeriella vulgata* (Kell., 3, 9, 10, 11, 12
(L) *Menacanthus chrysopharum* (Kell.), 11
(L) *Philopterus subflavescens* (Geof.), 1, 2, 10, 11
(L) *Ricinus* sp., 10
(F) *Ornithoica confluens* Say, 3, 10, 19
(F) *Ornithomyia avicularia* Linn., 12, 19
(T) *Hæmaphysalis leporis-palustris* Packard, 2
Eastern Tree Sparrow, *Spizella arborea arborea* (Wilson).
(L) *Degeeriella vulgata* (Kell.), 14
(L) *Ricinus* sp., 12
(M) *Analgopsis* sp., 2
Eastern Chipping Sparrow, *Spizella passerina passerina* (Bechstein).
(L) *Philopterus subflavescens* (Geof.), 2
(L) *Ricinus* sp., 2
(F) *Ornithoica confluens* Say, 3, 11, 19
(F) *Ornithomyia avicularia* Linn., 4, 8, 11, 19
(T) *Ixodes brunneus* Koch, 18b
(M) *Analgopsis* sp., 2
(M) *Liponyssus sylviarum* (C. & F.), 11
Eastern Field Sparrow, *Spizella pusilla pusilla* (Wilson).
(L) *Philopterus subflavescens* (Geof.), 2
(F) *Ornithoica confluens* Say, 2, 14
(F) *Ornithomyia avicularia* Linn., 14
(T) *Ixodes brunneus* Koch, 18b
White-crowned Sparrow, *Zonotrichia leucophrys leucophrys* (Forster).
(L) *Myrsidea incerta* (Kell.), 13
(L) *Philopterus subflavescens* (Geof.), 14
White-throated Sparrow, *Zonotrichia albicollis* (Gmelin).
(L) *Degeeriella vulgata* (Kell.), 3, 18b
(L) *Macrelæmus mæstum* (Kell. & Chap.), 18b
(L) *Myrsidea incerta* (Kell.), 18b
(L) *Ricinus* sp., 2
(F) *Ornithoica confluens* Say, 3
(F) *Ornithomyia avicularia* Linn., 3, 12, 13, 17, 19
(T) *Hæmaphysalis leporis-palustris* Packard, 18a, 18b
(T) *Ixodes brunneus* Koch, 18b
(M) *Liponyssus sylviarum* (C. & F.), 1
Eastern Fox Sparrow, *Passerella iliaca iliaca* (Merrem).
(L) *Degeeriella vulgata* (Kell.), 3, 18b
(L) *Menacanthus chrysopharum* (Kell.), 3, 13
(L) *Myrsidea incerta* (Kell.), 3, 12
(L) *Philopterus subflavescens* (Geof.), 1
(T) *Hæmaphysalis leporis-palustris* (Packard), 1
(M) *Proctophyllodes* sp., 18b
Lincoln's Sparrow, *Melospiza lincolni lincolni* (Audubon).
(F) *Ornithoica confluens* Say, 11, 12

Swamp Sparrow, *Melospiza georgiana* (Latham).
(L) *Menacanthus chrysophæum* (Kell.), 11
(F) *Ornithoica confluens* Say, 11
(F) *Ornithomyia avicularia* Linn., 11
(T) *Hæmaphysalis leporis-palustris* Packard, 18b
Eastern Song Sparrow, *Melospiza melodia melodia* (Wilson).
(L) *Degeeriella vulgata* (Kell.), 2
(L) *Menacanthus chrysophæum* (Kell.), 2, 3, 7, 11, 12, 17, 18b, 19
(L) *Ricinus melospizæ* (McG.), 2, 7
(F) *Ornithoica confluens* Say, 2, 8, 11, 14, 17, 18a, 19.
(F) *Ornithomyia avicularia* Linn., 2, 8 9, 11, 12, 14, 17, 18a, 19
(T) *Hæmaphysalis leporis-palustris* Packard, 2, 17, 18a, 18b
(T) *Ixodes brunneus* Koch, 17, 18a
(M) *Analges* sp., 2
(M) *Liponyssus sylviarum* (C. & F.), 8
(M) *Trombicula bisignata* Ewing, 18a
Eastern Snow Bunting, *Plectrophenax nivalis nivalis* (Linn.).
(L) *Menacanthus chrysophæum* (Kell.), 4
(L) *Philopterus subflavescens* (Geof.), 4
(L) *Ricinus* sp., 4

The writer is very anxious to obtain parasites from hosts not listed as well as other parasites from the birds listed above. It is hoped that banders will assist in enlarging this list and help to increase our knowledge of the abundance and distribution of the various ectoparasites, as well as the damage caused to their hosts.

All external parasites may be picked from the bird with a pair of small tweezers and placed in a small vial of 70 per cent alcohol for killing and preservation. Complete data should be given with each vial, such as host, band-number, locality, name of collector, and any other interesting data. In a previous paper[2] the writer gave a general discussion of the various groups of parasites found on birds. It may be consulted for further information. The Bureau of Entomology will be glad to assist in any problems relating to external parasites at any time.[3]

[2] *Bird-Banding*, Vol. 1, pp. 51–60, April, 1930.

[3] Specimens and mail should be addressed directly to Mr. H. S. Peters, Bureau of Entomology, Washington, D. C., in order to facilitate and hasten replies. Mr. Peters will send small vials of preservative to banders willing to collect and send him specimens for identification and for the collection of the Bureau of Entomology. *The Editor.*

# FURTHER NOTES ON THE NESTING OF THE TREE SWALLOWS[1]

By Seth H. Low

The one hundred bird-boxes in use at the Austin Ornithological Research Station in 1931 were so well patronized[2] that an additional four hundred were erected in 1932 for the purpose of acquiring for study additional data of broader scope and for determining how many Tree Swallows (*Iridoprocne bicolor*) the territory can support under existing conditions. In order to check the returns of 1931 residents to renest in the vicinity of the main station a few substations were established. The locations of these in respect to the Station and the number of boxes of each are as follows: fifty at substation A, five and one half miles north northwest; three at substation F, five miles due north; two at substation B, at the same distance due south; ten at substation C, two and one half miles south, and three one mile northwest at substation H. Substation W with its own ten boxes three miles southeast completes the list. The remainder of the five hundred wooden and fifteen tar-paper boxes were scattered over all the open spaces in the square mile which comprises the Station area.

## Returns

The return of birds of previous years is to be considered from two angles: the return of young to the vicinity of their birthplaces, and the rebreeding of adults in territory they used previously.

Two of the 157 young that left the boxes at the Station in 1931 were killed by automobiles before migrating. Of the remaining 155, seventeen (11 per cent) were recaptured this summer breeding at the Station and one was taken at substation A, five and one half miles north. Of eight nestlings banded in 1931 at substation W, three miles to the southeast, two nested at the station this year. The total return from 163 nestlings, then, was twenty (12 per cent). Two nestlings returned from each of three broods, but in no instance did more than two from a brood come back. This may indicate a high mortality during the first year of life.

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[1]Contribution No. 12 from the Austin Ornithological Research Station.

[2]Notes on the Breeding of the Tree Swallow by O. L. Austin, Jr., and S. H. Low. *Bird-Banding*, Vol. III, No. 2, April, 1932.

In 1931 seventy-four of the 120 adults breeding in the boxes were banded. One was killed so that 73 of them, in addition to 14 adults banded but not identified with boxes, making a total of 87 adults, were available to return. Twenty-two of the 73, (30 per cent) bred again in the boxes, two were recaptured in nets, and one was found dead beneath a telephone-line a mile and a half to the southeast. The return of known breeding swallows was twenty-five (34 per cent). In addition, two of the fourteen were known to breed this summer, so that the total returns from 87 adults were 27 (31 per cent). However, only 121 of the 230 adults breeding here in 1932 were captured, and 24 of these proved to be returns. If it is assumed that 121 is a fair sample of the adults and the ratio of 24 to 121 is indicative of the ratio of the number of returns to the 230, then the returns should have numbered about forty-five (52 per cent).

## Choice of Nesting Territory and Box Preference

In discussing a bird's choice of a nesting territory and nest site (and incidentally its abundance), it is extremely important to consider the limiting factors. The two most important are the food supply and the available nesting sites. Which is the more important depends on the species and the locality in question. With the Tree Swallow it is assumed arbitrarily that a near-by pond, swamp, or marsh insures a good supply of food. Nesting sites are limited to natural cavities and bird-boxes. The former are so few, if not even non-existent, they may be eliminated from the discussion. An abundance of boxes alone, however, does not remove the nesting limitation, for there are two further restrictions, the type of box and the position of the box.

The preference for different kinds of boxes is shown at the main station, where there is an excellent food-supply and a superabundance of boxes. One manufactured tar-paper box and two wooden, Station-made types are in use. The former is the standard Packard bluebird-box. The 1931 type is of half-inch white pine, and the dimensions are bottom 5 x 5 inches, back 9 x 5 inches, front 7½ x 5 inches, and top, which slopes from the back down over the hole, 7¾ inches square. The 1932 type is similar to the Higgins box and is equipped with a Higgins shutter. The box is 9 inches deep, 6 inches long, 5½ inches wide. The flat top, which overhangs the front by 2 inches, is hinged at the back and has weather-strips along the under edges, so that it fits snugly over the box. The front

opens also, being hinged at the bottom. Both wooden types have 1½-inch holes and are stained a light brown. The majority of the boxes are on 5½-foot posts in open fields.

In treating of the box preferences of the swallows, the returning young and adults are treated separately. The young are returning to nest for the first time, and the locality of their nesting sites can best be discussed in relation to their birthplaces. Of the 14 young breeding at the Station only two nested within five hundred feet of their birthplace. The others were scattered at varying distances over the square mile of the Station, but only one chose the 1931 type of box. Two more came to the Station from substation W, and one young from the Station went 5½ miles north to substation A.

The adults had, besides the 98 old boxes in their old location, an additional 334 new boxes and a dozen tar-paper ones. The last mentioned were erected on fence-posts along a railroad and alternated with wooden boxes. The wooden ones were taken, but the swallows scorned the tar-paper. Only one swallow, a male with a new mate, nested again in the same box it had occupied the previous year. Two adults chose new boxes adjoining their old ones, and three more returned to within one hundred feet of their old ones. The rest varied from two hundred feet to a mile from their previous sites, and it is interesting to note that of twenty-five returning adults, only one chose a box of the 1931 type. In 1931 sixty of the 98 old type boxes in use were occupied. This year the 98 were in the identically same positions, but were closely surrounded by three hundred odd new boxes in similar but in no more favorable positions. Only 13 in all of the 115 boxes which were occupied in 1932 were of the 1931 type. Therefore it is evident that the swallows have definite box preferences and prefer the 1932 type.

Substation A lacked a good food-supply but had fifty of the preferred boxes. At least thirty of these were in favorable positions, but only seven were occupied. Here the food is the limiting factor.

Substation C has a good food-supply. Ten identical boxes of the new type were put up on a small lot, five on posts and five on the building. Every one of the former were occupied, but not one of the later.

Substation W is an excellent example of the fruitless endeavors of laymen to attract birds. There are ten boxes, all close to a large pond. Seven are home-made affairs resembling dog-kennels, painted white and with the entrance at the base. Four are placed under the cornices of the house, and three high

on the trunks of pines. The other three are of the tar-paper type: two are on the barn and one on the side of a second-story dormer window. One of the barn boxes is partly concealed by vines and has never been occupied, but the other, at the peak of the barn roof, is used Likewise the tar-paper box on the dormer window is occupied each year, but only occasionally is one of the "kennels" inhabited. The poor types and positions of the boxes discourage the swallows here.

The Station serves as a fine illustration of what happens when there is plenty of food and favorable nesting-boxes are erected. In 1930 some forty-odd tar-paper boxes were sprinkled around the woods, mostly in the shade in locust groves. A few were on pines and two on posts in the open. The latter two were used, as were two on pine trees on the outer edges of groves. The only two adults banded in 1930 returned in 1931, but instead of taking their old boxes, they moved out to new ones in the open.

With 98 wooden boxes, mostly in the open, the population jumped in 1931 from 4 pairs to 60 pairs. In 1932, with over four hundred boxes available in favorable sites, there were 113 pairs of breeding birds.

While the ideal location for a box cannot be determined from these observations, certain ecological preferences of the Tree Swallows are evident. When, however, boxes are available on posts in open fields away from trees, those on buildings or trees will not be occupied.

## Acquisition of Adult Nuptial Plumage

It has been exceedingly difficult to distinguish between the sexes of the adults. The dull, brown birds and those with a faint tinge of green appear to be one-year-old females. The male obtains its brilliant plumage the first year, but the female apparently does not acquire it until the second year. The female may be slightly duller, but frequently she is indistinguishable from the male except when both are held together in the hand. Hence, the sexes must frequently be determined by behavior. The female does most of the incubating and is the only bird taken on the eggs. Likewise it is the female which does most of the brooding and which stays on the nest at night during the first week. The female generally enters the box directly, while the male flutters about the hole or alights on the perch and looks around before entering.

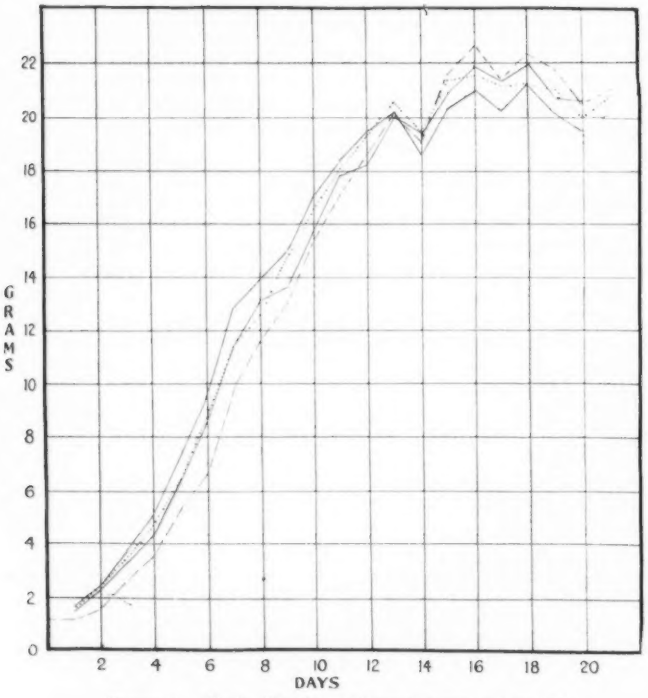


Figure 1. Daily Weights of Four Young in Box 129.

## Individual Nest Studies

Late in June opportunity was found to give some individual attention to three nests. The first nest, Box 129, faced south in an open field. The eggs were laid sometime between June 11th, when the nest contained only grass and a single feather, and the 19th, when four eggs nestled in a cup of feathers. Two eggs hatched on June 30th before 8.35 A.M. (Daylight-Saving Time). The nest contained no shells, and the female was incubating. By 10.00 A.M. a third young had hatched out. At 1.40 P.M. the young were found to weigh 1.5, 1.5, and 1.6 grams each, and the egg 1.2 grams. By 3.50 P.M. the fourth had hatched and weighed 1.5 grams.

The others then weighed 1.6, 1.7, and 1.8 grams. The birds were weighed daily thereafter between 10 and 11 each morning until they flew.

On July 1st the male was trapped in the box and banded. That night the first accident befell the brood. Strong south winds blew the top cover open, and an early morning storm deluged the box. The mishap was discovered at 9 A.M. The female was sitting tightly on the nest, and the young were alive but quite wet. Observations made from 10.25 A.M. to 11.46 A.M. (from a blind erected several days previously in front of the box) showed the remarkable adaptation of the behavior of the adults to an emergency. During the 81 minutes the male fed 10 times. Each time he came to the box he called, and the female came out. The male then entered, fed, and left; immediately the female returned to brood. Eight times this happened, but twice she entered the box before the male left. The female was away from the nest just once during the period, for six minutes. Observations were again made from 1.55 P.M. to 2.50 P.M. During 29 of these 55 minutes the young were removed from the box and weighed. The male fed five times during the remaining 26 minutes.

July 3d the box was watched from 10.00 A.M. to 12.15 P.M. except for 20 minutes while the young were weighed. Assuming that each time an adult enters it feeds the young, then each parent fed 14 times, a total of 28 times, or once every four minutes. During the afternoon between 2 P.M. and 4.05 P.M. the male fed but 9 times to the female's 20 times.

On the morning of the 7th it was found that the shutter had become closed during the night, either by the wind or by the tripping of some animal over the string. The adults, therefore, had been unable to feed the young. The parents did not desert, and the only harm was a slight decrease in the daily gain of weight of the young.

The blind was next occupied on the 10th from 2.01 to 3.30 P.M. The male fed 6 times and removed fecal sacs twice; the female fed 15 times and removed sacs thrice. During this period an immature swallow tried to invade the box. Again in the afternoon during a brief watch two young swallows entered the box and were trapped. One was unbanded, and the other was a nestling from a box a half-mile to the southwest. The latter had flown about the first of July. Two days later another young bird from the same locality was caught in the box. Whether they entered in hopes of being fed, from curiosity, or in answer to a premature sexual impulse (cf. Brewster; *The Auk*, XV, pp. 194–195, April, 1898) we can only con-

jecture. The shutter again became closed the night of the 12th and was not opened until 9.30 the following morning. Consequently the birds were not fed and so suffered a decided drop in weight.

The morning of the 14th the box was observed for two hours. The first hour passed without a bird entering the box, although swallows fluttered frequently before the hole. Then came an hour of very intensive feeding. The male fed 23 times, the female 25 times, a total of 48, or once every 75 seconds. One sac was removed by the male. Another intrusion occurred, but the bird was not caught.

The next watch was from 1.37 to 3.00 P.M. on the clear, hot afternoon of the 18th. The young were then well grown and lively, and both parents were feeding from the outside of the box. A young swallow sat almost constantly in the hole, and so received all the food The male fed 12 times, the female 14 times, a total of 26 in 66 minutes.

The first visit to the nest at 10 A.M. on July 20th revealed that two young had flown. A third flew after being weighed. The last one left during the afternoon. All had hatched June 30th, and all flew twenty days later.

During the same period another box, 408, was visited daily and its four young were weighed. This nest was close to the salt marsh and therefore had a better and handier food-supply. The nest suffered no accidents or interruptions except for a half-hour each noon when the young were weighed. The first egg was noted on June 11th, and on the next visit, June 16th, there were four. On June 28th at 9.40 A.M. one young had just hatched, and at 12.15 it weighed 1.5 grams while an egg also weighed 1.5. At 4.15 no more young had hatched, but all were out by noon the following day. The first young balanced the scales at 2.5 grams, and the others at 1.5, 1.6, and 1.9 grams. On July 18th one young escaped just after being weighed, and all had gone by 11 the next morning. The incubation period for this nest was 14 days and the period of the adolescence 20 days. Thus it seems that the many interruptions at box 129 did not delay the normal nesting period.

In conjunction with these, a third nest, 116, was watched. Two eggs were found on June 11th, and a third was laid that day or the next. Two of them soon appeared to be bad, and but one hatched, on June 27th. The chick weighed practically 2 grams the following noon and was weighed daily thereafter. A short watch was kept July 2d from 3 P.M. to 3.45 P.M. The female fed three times and the male twice. Excreta were

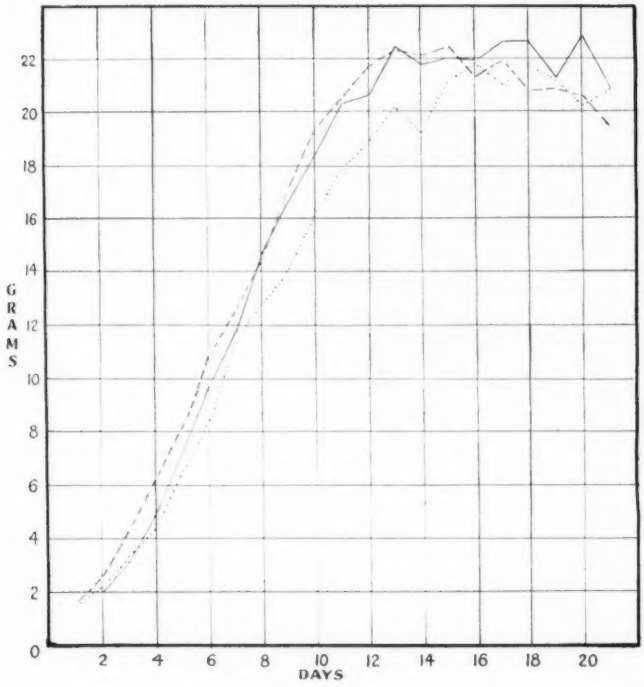


Figure 2

— — — Average Daily Weight of Four Young in Box 408.
. . . . . Average Daily Weight of Four Young in Box 129.
————Actual Daily Weight of One Young in Box 116.

removed once by the female. The male stayed in the hole after feeding until the female returned.

Observations were made at this box on July 3d from 2 P.M. to 4.05 P.M. while an assistant simultaneously watched box 129. The female fed 15 times; the male fed 8 times and remained on guard on top of the box twice. The single young was fed 21 times, while the four young in No. 129 received 28 meals between them. On the eleventh, following a short but heavy rain, further notes were taken from 3.15 to 5.15 P.M. The female spent most of the time sitting on the top of the box but

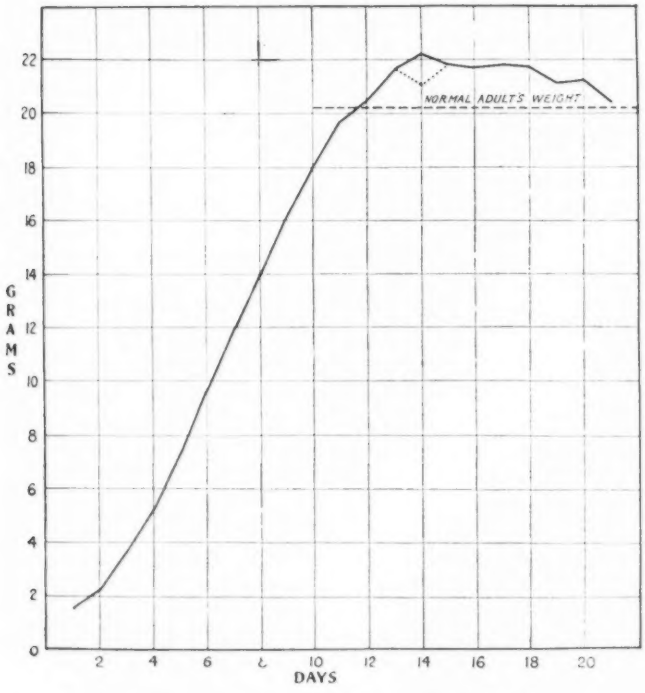


Figure 3. Average of Averages of Three Nests (9 birds).

fed twice and removed a sac. The male fed eleven times and also removed a sac. The young escaped from my hand on July 16th and flew off.

There seems to be little difference in the growth of this bird and the four in 129 and those in 408. The incubation period was about fifteen days and the period of adolescence was nineteen days, but the bird left prematurely.

## Weight Graphs

Figures 1, 2, and 3 show the growth of the young in grams to the nearest tenth. Fig. 1 shows the rate of growth of the

four nestlings in 129. The dip on the fourteenth day has already been explained; the shutter became closed accidently and the birds were not fed. Fig. 2 shows the average of the four lines in Fig. 1, the average daily weight of the four young in 408, and the actual weight of the single bird in 116. Fig. 3 shows the average of Fig. 2 and gives a fairly good picture. The dotted line on the 14th indicates the loss of weight in box 129, as explained above, and the solid line for that date averages the other two nests alone.

The young gained approximately two grams each day for the first eleven days, dropping to one gram per day until the peak was reached on the 14th. They then seesawed, gradually losing weight until they left the nest. A great deal of the variation may be accounted for by the time elapsed between the weighing and the excreting. The fecal sacs vary in weight between one and two grams.

At their peak the young weigh more than the adults, but gradually regress to normal adult weight just before they fly. Two adults were weighed with empty stomachs, and two were apparently full. The weights were ♀19.5 g., ♀20.3 g., ♂19.7 g., ♂21.2 g. The average of the four is 20.2.

## The 1932 Nesting Season

It was impossible to watch so large a number of boxes as were used this year, and hence no further investigation was made of the duration of the incubation and adolescent periods as a whole. The season seemed normal and lacked the disastrous rains of the previous spring; in fact, it was so dry that insect food may well have been scarce.

At the Station 115 boxes were occupied as against 62 in 1931. The lay of eggs was exceptionally good; the average clutch numbered five, whereas in 1931 it was four and one half.

If Table 1 (see below) be compared with the table in *Bird-Banding*, Vol. III, No. 2, April, 1932, P. 42, it will be seen that

TABLE I.

| *Station* | | *Substations A, B, C, H, F* | *Total* |
|---|---|---|---|
| *Eggs Per Nest* | *No. of Nests* | *No. of Nests* | *No. of Nests* |
| 7 | 4 | 2 | 6 |
| 6 | 24 | 5 | 29 |
| 5 | 64 | 8 | 72 |
| 4 | 17 | 3 | 20 |
| 3 | 4 (3 deserted) | 0 | 4 (3 deserted) |
| 2 | 1 (deserted) | 0 | 1 (1 " ) |
| 1 | 1 ( " ) | 0 | 1 (1 " ) |

while five eggs per clutch still predominates, six has replaced four for second position. The number of large clutches and the comparative absence of small ones is encouraging. All of the latter but one (a late clutch in box 116) were deserted before they were completed.

The hatch was far more successful than in 1931. Whereas 30.5 per cent of the eggs failed to hatch in 1931, in all the boxes this year only 15.9 per cent were failures. Only 13 clutches, comprising 51 eggs, were complete failures. Six, containing 21 eggs, were destroyed by natural enemies, and in two of these cases the female was known to move into the next nearest box and nest again. Seven nests with thirty eggs were deserted probably because the eggs were sterile or the young were killed by exposure. One female of this group was found subsequently nesting again in an adjoining box. Fifty-six eggs failed in boxes where other eggs hatched. The summary, then, in regard to hatch is 13 complete failures, 37 partial failures, and 83 complete successes.

Although the hatch was very gratifying, the mortality of nestlings was fully as disheartening as in 1931—162 young, 28. 7 per cent of the hatch, died in the nest.

Table 2 shows the distribution of the mortality, from which it is evident that the larger the brood the more likelihood there is of mortality.

TABLE II

| *No. of Young Per Nest* | *No. of Nests* | *No. in which there was Mortality* | *Percentage* |
|---|---|---|---|
| 7 | 4 | 2 | .. |
| 6 | 17 | 10 | 58.8 |
| 5 | 56 | 27 (24) | 48.2 (42.8) |
| 4 | 31 | 11 | 35.5 |
| 3 | 7 | 1 | 14.3 |
| 2 | 4 | 2 (1) | .. |
| 1 | 1 | 0 | .. |

Of the 162 young which died in the nest, the cause of death was determined satisfactorily in but 22 instances, as follows:

| | | |
|---|---|---|
| Exposure and desertion following the blowing open of the box-cover | 10 | young |
| Deserted by parents and starved as result of experimental work | 2 | " |
| Crowded to death by their siblings in the nest | 5 | " |
| Killed by mammal (probably a red squirrel) | 5 | " |

The cause of death in the remaining 140 nests was not determined. No explanation seems satisfactory. The weather was fine throughout the period. No *Protocalliphora* have been found in the nests. If a disease or parasites were responsible,

one would expect whole broods to be wiped out each time. While twenty-one entire broods were annihilated, there was only partial mortality in thirty-two nests. Nine nests lost but a single bird, thirteen nests lost two, six of them lost three young, three lost four, and in one case six young out of seven died. Five of these casualties followed crowding by their older siblings in the nest when they were still very young, but most of the others were fully feathered, and a few died the day before their siblings flew.

One bird over seventeen days old was found just as it was dying. It appeared to be gasping for breath, and stretched out shortly and died. The bird was immediately autopsied by Dr. Oliver L. Austin. There was nothing in its œsophagus and no signs of hemorrhage or head injury. The heart, lungs, and liver were in good condition. A gross examination was entirely negative. The stomach contained about three grains of partially digested insects. Two other birds in this nest had already died and two more survived and flew.

The following table sums up the 1932 nesting seasons of the Tree Swallow:

| | | |
|---|---|---|
| Number of eggs laid | 671 | |
| Eggs destroyed by natural enemies | 21 | |
| Eggs deserted by parents, cause unknown | 30 | |
| Eggs deserted by parents because of failing to hatch (bad and sterile) | 56 | |
| Number of eggs hatching | 564 | 84.1 per cent |
| Young killed by natural enemies | 5 | |
| Young crowded to death | 5 | |
| Young killed by an experiment | 2 | |
| Young killed by box opening | 10 | |
| Young dying due to unknown causes | 140 | |
| Total mortality to young | 162 | 24.1 per cent |
| Number of young reared | 402 | |
| Reproductive efficiency | | 60 per cent |

# STATE DISTRIBUTION OF RETURNS FROM BANDED DUCKS. THIRD PAPER—LOUISIANA, MAINE, MASSACHUSETTS, MICHIGAN, MINNESOTA, AND MISSOURI[1]

By FREDERICK C. LINCOLN

As previously stated[1], the purpose of this series of short papers, illustrated with dispersal maps, is to acquaint students of birds, sportsmen, conservation officials, and others with the information that is being obtained by the Biological Survey from banding work with migratory waterfowl. It is planned to publish detailed discussions of the data in future reports.

In explanation of the maps, it may be stated that the circumscribed areas indicate the points of banding in the several States. In some cases the number of local recovery records is shown within this area. From this area lines have been drawn to the different States and Provinces where the banded ducks have been reported; the figures represent the total number of records reported, including all the species. The status of each species is usually given in the accompanying statement. The terminals of the lines do not indicate exact points of recovery, but merely show that banded ducks have been reported from those States or Provinces. The data included are as compiled on July 1, 1932.

The first paper showed the distribution of ducks banded in Alberta; the second, ducks banded in British Columbia, California, Connecticut, Georgia, Illinois, Iowa, and Kansas; and this paper, ducks banded in Louisiana, Maine, Massachusetts, Michigan, Minnesota, and Missouri.

## LOUISIANA

More ducks have been banded in Louisiana than in any other State, the total number being 15,574, principally the work of E. A. McIlhenny, of Avery Island. Mr. McIlhenny's interest in this means of investigation began in the days of the American Bird Banding Association, and since the work was taken over by the Biological Survey in 1920 his station has been in operation nearly every season. He has personally banded upwards of 11,000 birds, more than half of which were

[1]First paper: *Bird-Banding*, Vol. 3, pp. 140–142, Oct. 1932.
Second paper, *Bird-Banding*, Vol. 4, pp. 19–32, Jan. 1933.

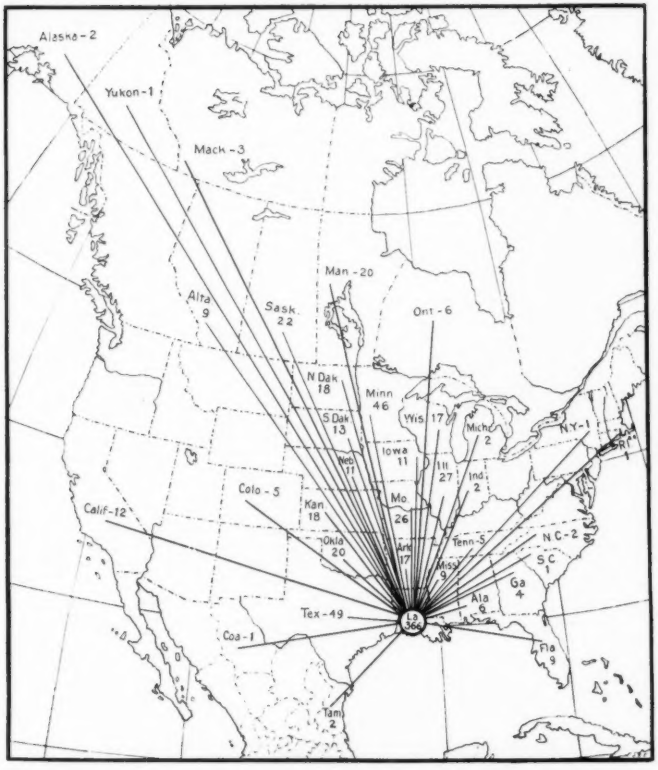


**Figure 1. Distribution of Return Records from Ducks Banded in Louisiana.**

Lesser Scaups. The Pintail ranks second in point of numbers, followed by the Blue-winged Teal. In addition to these, many Mallards and Ring-necked Ducks, and a few each of the Black Duck, Canvas-back, and Greater Scaup, have been banded.

The writer started a waterfowl-banding station at the Paul J. Rainey Wild Life Sanctuary, south of Abbeville, in January, 1929. This work was aided by the American Wildfowlers, and was conducted in coöperation with the National Association

of Audubon Societies. Archie V. Hull, of Brigham City, Utah, was employed by the Wildfowlers to continue the work. At that time 105 Canvas-backs, 52 Pintails, 50 Mallards, 38 Ring-necks, 18 Redheads, 5 Black Ducks, and 3 Lesser Scaup Ducks were banded. The work was resumed by the writer in December, 1929, and yielded 644 Lesser Scaups, 1 Mallard, and 1 Canvas-back. Since that time the station at the Rainey Sanctuary has been operated by the superintendent, Richard Gordon, who has placed bands on nearly 3500 ducks, mostly Lesser Scaups, with many Ring-necks, Mallards, Pintails, and Canvas-backs, and one each of the Ruddy and the Black Duck.

From these bandings, return records to the number of 764 are available for study (Fig. 1). Of these, the Lesser Scaup leads with 321 returns, followed by the Pintail with 137; the Blue-winged Teal, 115; Ring-necked Duck, 77; Green-winged Teal, 41; Mallard, 40; Canvas-back, 18, Redhead, 6; Gadwall and Wood Duck, 4 each; and the Black Duck, 1.

It is significant that of all the ducks banded in Louisiana, which is the southern terminus for a large part of the flight down the Mississippi Valley, only three have been subsequently recovered in Mexico. Two of these were Pintails, killed near Matamoras, State of Tamaulipas, and the third was a Green-winged Teal, recovered in the State of Coahuila. It appears that the majority of the ducks wintering in Louisiana come from the Prairie Provinces, principally Saskatchewan and Manitoba, but it is noteworthy that several records have been received from the sub-arctic regions of Mackenzie, Yukon Territory, and Alaska. Both of the Alaskan records and the one from Yukon are of Pintails. The Mackenzie records are of two Lesser Scaups and one Ring-neck.

Roughly, the flight zone may be said to extend west to the Dakotas, Nebraska, and Kansas, and east to Wisconsin and Illinois. This is quite definitely shown by the sharp reduction in the number of return records reported from neighboring States, both to the east and to the west of this group.

The possible significance of the 12 recoveries in California can not be explained at present other than that it suggests the probability that some birds of the Mississippi Valley flight regularly become associated on the breeding grounds or during the early stages of autumn migration with Western flocks and that they may travel south together. Seven of the California recoveries were Pintails, four were Green-winged Teals, and one a Canvas-back. Both the Pintail and the Green-winged Teal have breeding ranges that extend north well within the Arctic Circle so it is easy to understand how mixing may occur.

Of special interest are the records on the Atlantic coast. Of the 18 returns reported from this section, extending from Florida north to Rhode Island, 16 are of the Lesser Scaup, the remaining 2 being of a Ring-necked Duck and a Blue-winged Teal that were recovered in Georgia. The data for the Lesser Scaup would indicate an important migration route that extends south along the Atlantic coast and then in an east and west direction along the Gulf coast, the existence of which has not been previously suggested. One Lesser Scaup (A656387) banded by the author at the Rainey Sanctuary on December 4, 1929, was recaptured six days later at Dover, Georgia.

## MAINE

Waterfowl-banding in Maine was instituted through the coöperation of Joseph Pulitzer, of St. Louis, Missouri, who started a banding station near Bar Harbor in October, 1921. Assisted by Frank Thompson and later by E. M. DeMeyer, he operated this station each season until the autumn of 1927. In all, 759 Black Ducks were banded there in the seven years.

The accompanying map (Fig. 2) illustrates a situation that is more or less paralleled by that of the Mallards that in autumn congregate in southern British Columbia, namely extreme localization.[2] The banding was done chiefly between the middle of September and the end of October, and the data indicate that the birds marked were almost entirely local breeders. Evidence to support this statement is found in the fact that in subsequent seasons only three Maine birds were recovered at more northern points. Information from sportsmen and others points to a late flight that probably is composed chiefly of the ducks from the coastal breeding grounds northward to the Maritime Provinces and Labrador. For this reason it is important that waterfowl-banding be resumed in this State and continued throughout the period that ducks are present.

While a few Black Ducks banded in Maine have been reported from nearly every State south to and including North Carolina, it seems evident that the bulk of the birds of this species that breed in the New England region do not make such long migratory flights as do those from breeding grounds in the interior. This is indicated by a review of the records of the Black Ducks banded in Michigan, appearing in the present paper, and to an even greater extent by data from

[2]Second paper: *Bird-Banding*, Vol. 4, pp. 19–32, Jan. 1933.

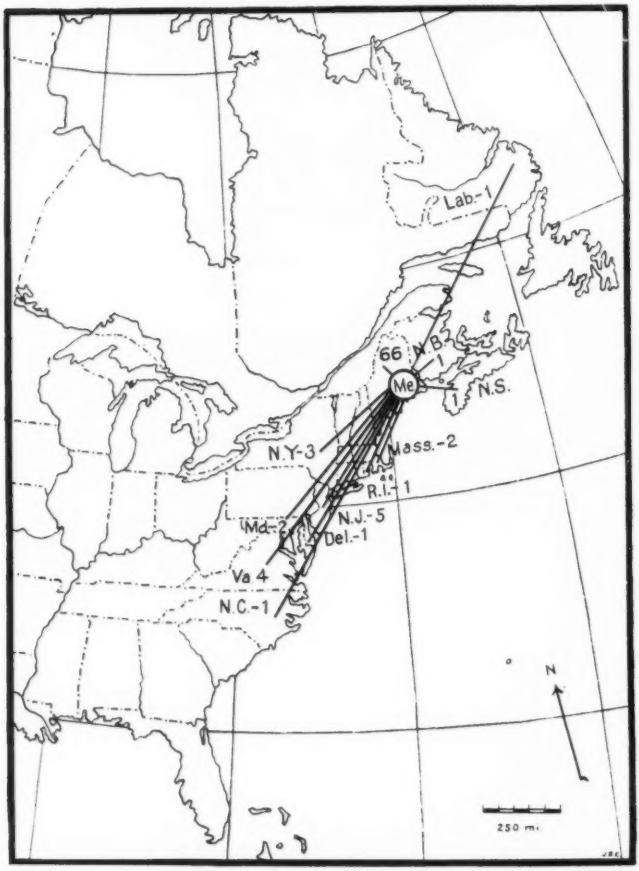


Figure 2. Distribution of Return Records from Ducks Banded in Maine.

**Figure 3. Distribution of Return Records from Ducks Banded in Massachusetts.**

banding work in Ontario, which will be included in the fourth paper of this series.

## MASSACHUSETTS

Several years ago Dr. John C. Phillips banded a few ducks, mostly Mallards, at Wenham Lake, but systematic operations in Massachusetts were not begun until 1928. In November of that year Arthur Rotch, of Boston, started banding work

at Brewster and has continued during each successive season. His total to July 1, 1932, was 592 birds, of which 589 were Black Ducks and the remaining 3 Mallards.

Waterfowl-banding at the O. L. Austin Ornithological Research Station, at North Eastham, on Cape Cod, was begun in June, 1930. This station is in continuous operation during the time waterfowl are present in numbers. The total number banded, as here considered, is 682, of which 622 were Black Ducks, 55 Canada Geese, 2 Wood Ducks, 2 Red-breasted Mergansers, and 1 an Old-squaw.

Return records from these combined bandings total 168, divided into 153 for the Black Duck, 13 for the Mallard, and 2 for the Wood Duck

Further evidence of the restricted migration performed by some of the Atlantic coast Black Ducks, is found in a consideration of these data (Fig. 3). It seems obvious that there must be many of these ducks that do not migrate south extensively or with any degree of regularity. The southernmost records in the present series are the two recovered in Virginia (the return for North Carolina is for a Mallard, and the Georgia record is for a Wood Duck), and, as the map shows, there are few from intermediate points. Also the breeding grounds apparently are principally near the coast, north casually to Labrador. The single record for North Dakota is of a Mallard and, in the light of our present knowledge, it has no particular significance.

### MICHIGAN

Through the active coöperation of the State Department of Conservation, waterfowl-banding in Michigan was started in 1928, under the direction of Dr. Miles D. Pirnie. A trapping station was placed in operation at Munuskong State Park, near Pickford, in the able hands of Dr. Karl Christofferson. In 1920 Doctor Christofferson took charge of Blaney Park, where he started a new station, while the one at Munuskong continued with Willard Ferguson in charge. In addition to the Mallards, Black Ducks, Wood Ducks, Pintails, Teals, and other ducks taken by the trapping stations, a large number of hand-reared Mallards also have been banded and released.

In 1931, Doctor Pirnie left the Department of Conservation to become Director of the Kellogg Bird Sanctuary, at Augusta. At this point he immediately resumed operations and has banded more than 2000 Mallards, Black Ducks, Gadwalls, Baldpates, Pintails, Green-winged Teals, Wood Ducks, Redheads, Canvas-backs, Lesser Scaups, and Canada Geese.

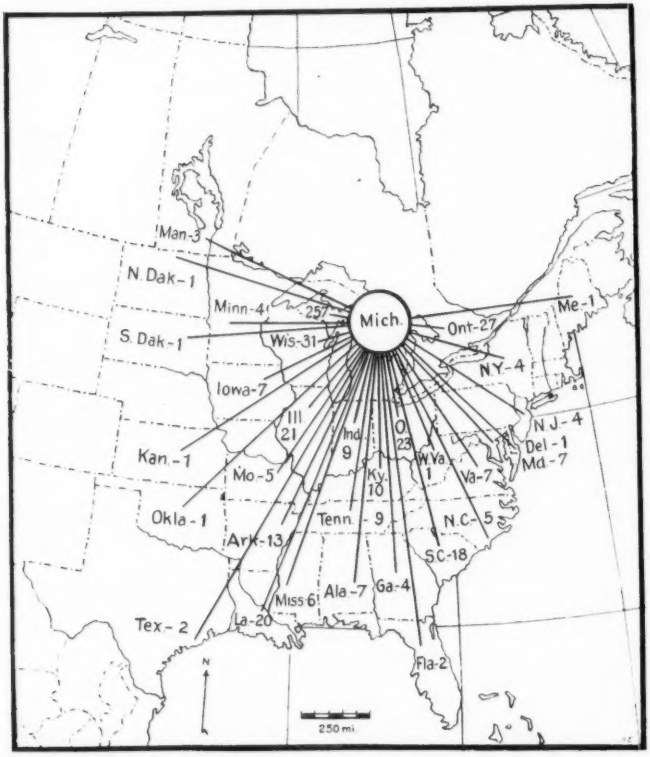


Figure 4. Distribution of Return Records from Ducks Banded in Michigan.

Frank E. Swartz, of Milford, banded a few Mallards and Black Ducks during the autumn of 1928.

The total number of ducks banded in Michigan (as of July 1, 1932) is 4474. These have produced 623 returns, of which 351 were of Black Ducks, 248 of Mallards, and the others were scattered in small numbers through seven species. As in other similar cases where much banding has been done during the open shooting season, a large number of local returns

were obtained. Of the 257 birds recovered within the State 185 were Black Ducks and 63 were Mallards.

In contrast to the almost sedentary habits of some of the Black Ducks on the North Atlantic coast, many individuals of this species banded in Michigan have traveled south to South Carolina (10), Georgia (3), Florida (2), Alabama (6), Mississippi (2), Louisiana (14), and Texas (1). In other words, there seem to be regular and well-defined flights for this species (and for the Mallard) down the Mississippi Valley via Wisconsin and Illinois, and to the lower Atlantic coast by way of southern Ontario and the Ohio marshes on the south shore of Lake Erie. It is noteworthy that records west of the States bordering the Mississippi River (Fig. 4) are few and scattered. The single cases from the Dakotas, Kansas, and Oklahoma, and one from Texas, were of Mallards. On the other hand, most of the birds recovered from the North Atlantic coast were Black Ducks.

Evidence strongly indicates that most of the birds banded in Michigan were locally bred, but a few may have been from Ontario and the Northwest.

## MINNESOTA

The first waterfowl-banding in Minnesota for the Biological Survey was done in 1927, when George T. Baker started a station at Bemidji, in the north-central part of the State. The number of ducks banded at this point is 508, chiefly Mallards and Lesser Scaups, with a few Black Ducks, Wood Ducks, Blue-winged Teals, and Greater Scaups.

In 1928, J. M. Eheim banded 156 ducks, mostly Mallards, at Hutchinson; during the spring of 1930, A. E. Forder banded 180 Mallards at Thief Lake; and in June of that year Dr. Oliver L. Austin, Jr., banded 3 Mallards and a Golden-eye at Cass Lake.

The total number of ducks thus far banded in Minnesota is 848, from which 94 return records have been received.

While the data are not extensive, they nevertheless clearly illustrate the flight passing through Minnesota from the Prairie Provinces of Canada and continuing down the Mississippi Valley to the Gulf coast. The records from the Dakotas, Kansas, and Texas indicate that in addition to the flight through the Mississippi Valley there is a tendency for many birds from this north-central region to join the flocks passing southward across the Great Plains (Fig. 5). All six of the Kansas records are of Mallards, while two of those from Texas

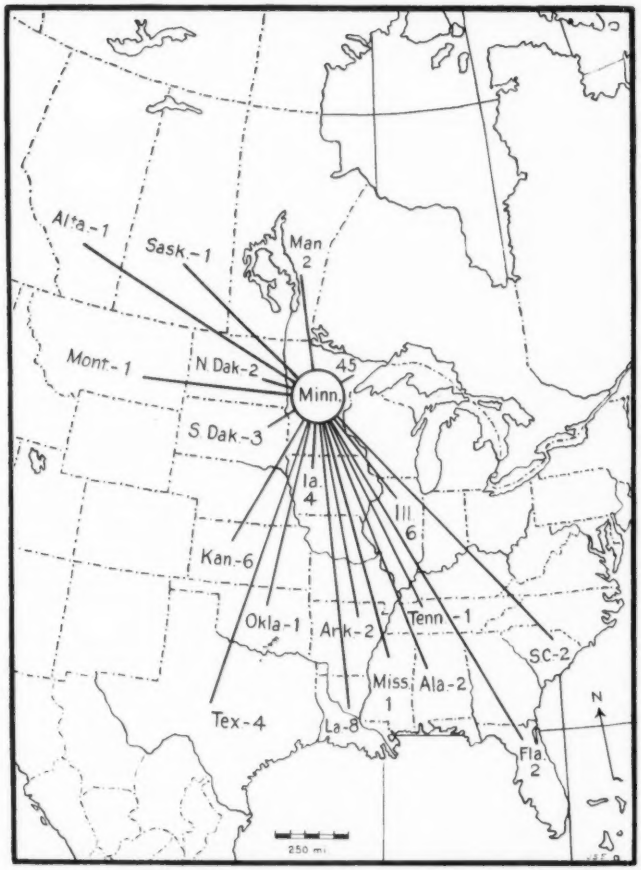


Figure 5. Distribution of Return Records from Ducks Banded in Minnesota.

are of this species. Both records from Florida are of the Lesser Scaup.

Two Mallards returns are of sufficient interest to be given in detail. No. 233204, banded at Hutchinson on October 6, 1929, was killed in Fergus County, Montana, on October 16, 1930; and No. A693891, banded at Bemidji on October 13,

1931, was retaken almost exactly a month later, on November 14, 1931, at Green Sea, South Carolina.

### MISSOURI

The total number of ducks banded in Missouri up to July 1, 1932, was 3178.

Banding work in this State was started in 1922 through the interest and coöperation of Joseph Pulitzer and Clark McAdams, of St. Louis. A station was placed in operation on the grounds of the Cuivre Island Club, near Firma, where the superintendent, Van Walton, banded 2145 birds, mostly Mallards, with a few Black Ducks, Baldpates (Widgeons), and Pintails. This station remained in operation through the season 1924–25.

Stimulated by the success of the Cuivre Island station, Mr. Pulitzer and Mr. McAdams were instrumental in the establishment of a second station at the Marais Temps Claire Club, at Portage des Sioux. Work here was begun by the keeper, John Broeker, in 1924 and continued until the spring of 1928, during which time 953 ducks—Mallards, Black Ducks, Baldpates, Pintails, Blue and Green-winged Teals, and Shovellers were banded.

In March, 1926, T. E. Musselman, of Quincy, Illinois, banded 72 Mallards and 8 Pintails at Scobey Lake.

From this work, 944 return records are available for study, of which 875 are of Mallards.

These data well illustrate the great importance of the flyway that follows the Mississippi River and the Plains region from the indicated breeding grounds in the North Central States, Manitoba, Saskatchewan, and eastern Alberta, south to Louisiana and Texas (Fig. 6). The normal boundaries of this migrational highway are clearly shown as Wisconsin, Illinois, eastern Tennessee, and Mississippi on the east, and the Dakotas, Nebraska, Kansas, Oklahoma, and eastern Texas on the west. Along this broad highway flows the most important stream of bird travel on the North American Continent. As was noted by the return records from ducks banded in Louisiana, there is a sharp reduction in the number of returns from the States to the east and west of those marking the boundaries of this flight (p. 88).

There are, however, some interesting strays from the main flight, a few of which are worthy of detailed report. The most northern record is for a Mallard (200515) banded in January at Cuivre Island and recaptured during the following June at Willow Lake, northeast of Fort Simpson, Mackenzie. All the Alberta records are of Mallards, as is also the single one from

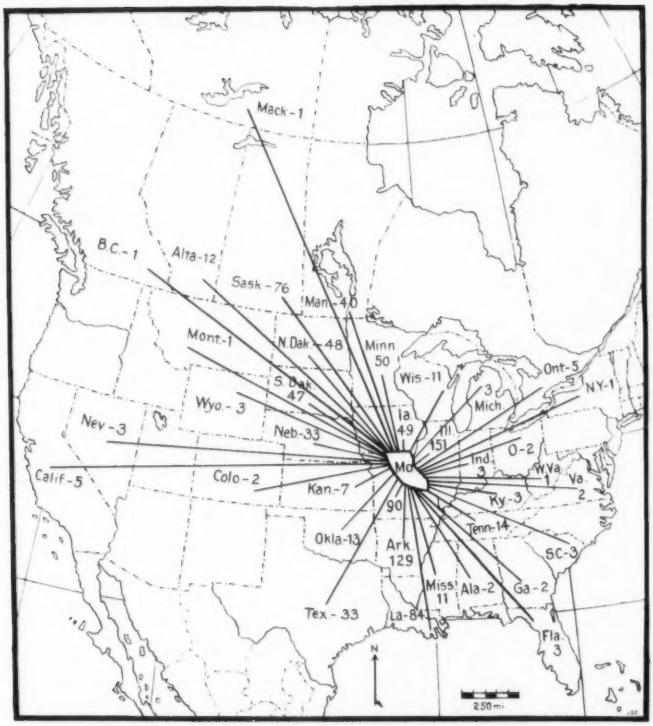


Figure 6. Distribution of Return Records from Ducks Banded in Missouri.

British Columbia. In the latter case before it was killed the bird carried its band 33 months. As is to be expected, four of the records from Ontario are of the Black Duck. The fifth was of a Mallard. Four of the birds recovered in California were Pintails, and the fifth was a Mallard; two Pintails and one Green-winged Teal were killed in Nevada.

On the Atlantic coast one Mallard was taken in New York, one in West Virginia, one in Virginia, three in South Carolina, two in Georgia, and two in Florida. The second Virginia record is of a Black Duck, and the third from Florida is of a Blue-winged Teal.

Biological Survey, Washington, D. C.

# BANDING AT GROTON, MASSACHUSETTS
## 1929–1931

By WILLIAM P. WHARTON

In spite of the banding of 2752 birds of 68 species at my Groton station in the three years 1929–1931, only eight individuals have been recovered at other points—five Eastern Purple Finches, two Eastern Robins and one Eastern Savannah Sparrow. Of the 1980 birds banded prior to that period, as summarized in an article in the *Bulletin of the Northeastern Bird-Banding Association*, Vol. V, pp. 98–102, only three were reported as recoveries. This meagre percentage of recoveries (.29 per cent and .151 per cent respectively) cannot be otherwise than disappointing to those who on beginning this work had looked forward to gathering information which would rather quickly lead to a charting of the migration routes of each species which could be banded in numbers. It is particularly surprising in my own case that not a single recovery of such an abundant and easily banded species as the Song Sparrow has been reported. Although 691 individuals of this species had been banded up to 1929, and 738 were banded in the period covered by this article, not a bird has been heard from except the comparatively few which have returned to Groton with the advent of spring. Likewise, out of 209 Savannah Sparrows, 171 Eastern Chipping Sparrows, 168 Slate-colored Juncos, 156 White-throated Sparrows, and 123 Eastern Tree Sparrows, banded in the three-year period not a bird has been reported from any other locality with the exception of the single Savannah Sparrow mentioned above. It is noteworthy also that but three of the recoveries, all Purple Finches, have been reported as trapped by banders.

Recoveries reported during the three-year period, and those of birds banded during that period but taken subsequently, are as follows:

TABLE I

| *Date recovered* | *Band number* | *Species* | *Age and sex when banded* | *Where recovered and by whom* | *Date banded* |
|---|---|---|---|---|---|
| May 19, 1929 (Trapped) | 37972 | Purple Finch | female or young male | Mrs. J. Franklin Anthony, Bar Harbor, Maine. | May 6, 1929 |
| May 22, 1930 Rosy male (Trapped) | 37972 | Purple Finch | female or young male | Mrs. J. Franklin Anthony, Bar Harbor, Maine. | May 6, 1929 |
| Dec. 5, 1929 (Trapped) | B86022 | Purple Finch | female or young male | Mrs. A. S. Wilder, Westfield, Mass. | May 15, 1929 |
| Jan. 30, 1930 Rosy male (Trapped) | B86022 | Purple Finch | female or young male | Thornton W. Burgess, Springfield Mass. | May 15, 1929 |

| | | | | | |
|---|---|---|---|---|---|
| Jan. 17, 1930 (Dead) | B32854 | Purple Finch | juvenile | Mrs. W. F. McDaniel, Green Pond, Alabama. | Aug. 5, 1929 |
| Jan. 25, 1930 (Dead) | B32873 | Purple Finch | probably juvenile | J. Railsback, Shreveport, La. | Aug. 15, 1929 |
| Dec. 29, 1931 (Killed) | A278266 | Robin | juvenile | H. Sumrell, Ayden, Pitt Co., N. C. | June 26, 1931 |
| June 24, 1932 (Dead) | A278295 | Robin | nestling | A. W. Oppel, Lavallette, N. J. | July 28, 1931 |
| July 5, 1932 (Dead) | F59044 | Savannah Sparrow | | Mrs. Henry Beach, Port Morien, Cape Breton, Nova Scotia. | Oct. 3, 1931 |
| Sept. 20, 1932 (Trapped) | F38003 | Purple Finch | female or young male | T. F. Power, Worcester, Mass. | May 10, 1931 |

Notwithstanding lack of results hoped for in studies of migration routes, valuable information has been gathered on other matters. Six new species have been taken as returns: Eastern House Wren, Catbird, Eastern Cowbird, Eastern Red-winged blackbird, American Redstart, and Blue Jay, making a total of 13 species recorded as returning to this

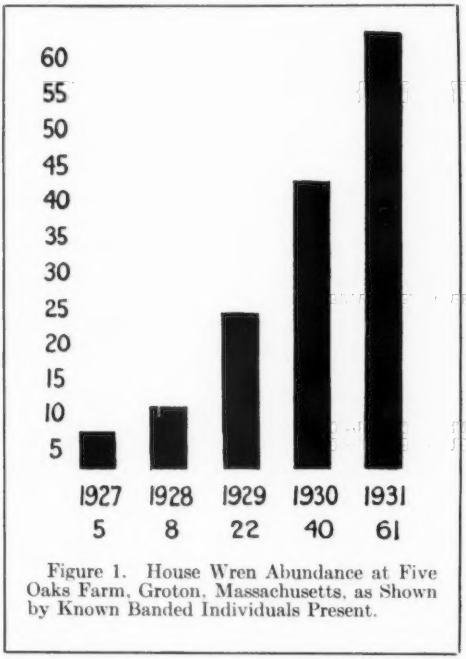


Figure 1. House Wren Abundance at Five Oaks Farm, Groton, Massachusetts, as Shown by Known Banded Individuals Present.

station. The validity of the Blue Jay record as a true return, however, may be questionable. A remarkable increase in the House Wren is indicated by the fact that the number banded in 1931 was 57, as compared with 36 in 1930, 21 in 1929, and 12 in 1928. No other commonly banded species shows such a marked progressive change in numbers. The causes for this remarkable increase, apart from the availability of large numbers of nesting-boxes, are not apparent; but it should be remarked in this connection that this species seems to be practically immune from the attacks of the Protocalliphora larvæ which are such a menace to the young of Bluebirds and Tree Swallows. The increase in the numbers of House Wrens returning to and raised at this station is shown in the accompanying table and graph.

Table II shows in detail returns of Wrens during the three years under consideration:

TABLE II

RETURNING HOUSE WRENS AT GROTON, MASS.

| | *Date and Age When Banded* | *Returns* | | |
|---|---|---|---|---|
| | | 1929 | 1930 | 1931 |
| B37565 | May 15, 1928 adult | June 3 | | |
| B32823 | July 8, 1929 adult | | June 19 | July 7 |
| B86075 | June 12, 1929 adult | | June 21 | |
| B32827 | July 22, 1929 prob. adult | | Aug. 1 | June 17 |
| B86002 | May 11, 1929 adult | | Aug. 3 | |
| C71664 | Aug. 3, 1930 adult | | | May 15 |
| C71661 | Aug. 18, 1930 juvenile | | | July 7 |

| *Year* | *Total Banded* | *Nestlings* | *Juveniles* | *Adults* | *Undetermined* | *Returns* |
|---|---|---|---|---|---|---|
| 1927 | 5 | 5 | 0 | 0 | 0 | 0 |
| 1928 | 8 | 6 | 0 | 2 | 0 | 0 |
| 1929 | 21 | 14 | 1 | 4 | 2 | 1 |
| 1930 | 36 | 32 | 1 | 3 | 0 | 4 |
| 1931 | 57 | 52 | 0 | 5 | 0 | 4 |
| Totals for five year period | 127 | 109 | 2 | 14 | 2 | 9 |

Returns of Song Sparrows during the three-year period from the 656 birds banded in the years 1928–1930, 26 in number, were 3.968 per cent, as compared with 4.017 per cent for the period 1922–1928 covered in my previous article. The high point was reached with 5.504 per cent for 1928 birds; then came 5.194 per cent for 1929 birds; 1930 birds slumped heavily to 2.894 per cent. This proportion of returns though small in comparison with similar percentages of other species returning to their wintering grounds, is not surprising in view of the fact that most of the birds banded are juveniles flocking together in August, or later true migrants taken chiefly in October. It is worth mentioning, however, that returns of birds banded as juveniles are common. This is shown in Table III.

TABLE III

| | *Number banded* | *Number returned* | *Returns classified when banded as* | | |
|---|---|---|---|---|---|
| | | | *Juvenile* | *Adult* | *Unrecorded* |
| 1926 | 85 | 2 | 0 | 1 | 1 |
| 1927 | 193 | 2 | 2 | 0 | 0 |
| 1928 | 218 | 12 | 6 | 3 | 3 |
| 1929 | 231 | 11 | 6 | 1 | 4 |
| 1930 | 207 | 4 | 2 | 1 | 1 |
| | 934 | 31 | 16 | 6 | 9 |

Some of these returns were retaken for the first time during July or August, probably indicating near-by nesting, but not necessarily close proximity to the territory on which they were hatched. Others, seven in number, retaken in spring, have repeated more or less in the summer, indicating probable nesting close to the place of birth. It should be added, however, that all of these birds were banded as juveniles, not as nestlings, and consequently the exact spot where they were hatched is unknown.

The following table shows in detail records of all Song Sparrows which returned during the three years 1929–1931:

TABLE IV

RETURNING SONG SPARROWS AT GROTON, MASS.

| | | *Returning Dates* | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | *Date banded* | 1925 | 1926 | 1927 | 1928 | 1929 | 1930 | 1931 |
| 54668 | Oct. 18, 1924 | Oct. 28 | May 27 | June 2 | June 4 | May 28 | | |
| A12168 | Sept. 20, 1925 | | | | | Oct. 25 | | Oct. 15 |
| A181192 | Sept. 5, 1926 | | | | | May 14 | June 3 | May 24 |
| A183716 | Sept. 18, 1926 | | | | | Early Apr. found dead | | |
| A90856 | July 28, 1927 | | | | Aug. 2 | June 5 killed | | |
| A90869 | July 29, 1927 | | | | June 12 | May 29 | | |
| B34183 | Aug. 22, 1928 | | | | | Apr. 10* | | |
| B46732 | June 12, 1928 | | | | | Apr. 28 | May 7 | May 28 |
| B37566 | May 15, 1928 | | | | | Apr. 28 | | |
| B34130 | Aug. 7, 1928 | | | | | May 5 | | |
| 696478 | Oct. 13, 1928 | | | | | May 6 (dead) | | |
| B34105 | Aug. 2, 1928 | | | | | June 1 | May 26 | May 26 |
| 696403 | Sept. 28, 1928 | | | | | June 2 | | |
| B34132 | Aug. 7, 1928 | | | | | July 12 | May 9 | |
| B34128 | Aug. 6, 1928 | | | | | | May 28 | June 2 |
| B34129 | Aug. 6, 1928 | | | | | | Aug. 13 | |
| B34159 | Aug. 15, 1928 | | | | | | Aug. 5 | |
| 696461 | Oct. 10, 1928 | | | | | | Aug. 15 | |
| A130082 | Aug. 8, 1929 | | | | | | May 6 | |
| A130093 | Aug. 11, 1929 | | | | | | May 10 | |
| A130129 | Aug. 16, 1929 | | | | | | May 11 | |
| A130161 | Aug. 28, 1929 | | | | | | May 12 | May 13 |
| A130206 | Sept. 21, 1929 | | | | | | May 13 | †May 27 |
| A130115 | Aug. 13, 1929 | | | | | | May 19 | May 15 |
| A130239 | Oct. 10, 1929 | | | | | | May 28 | |
| A130130 | Aug. 16, 1929 | | | | | | June 2 | Oct. 4 |
| A130055 | July 27, 1929 | | | | | | July 28 | |
| A130193 | Sept. 15, 1929 | | | | | | Oct. 6 | |
| A130123 | Aug. 15, 1929 | | | | | | | June 4 |
| C71623 | July 23, 1930 | | | | | | | May 28 |
| C71721 | Aug. 10, 1930 | | | | | | | July 29 |
| C62908 | May 5, 1930 | | | | | | | Aug. 19 |
| C97198 | Oct. 14, 1930 | | | | | | | Oct. 21 |

Further evidence of the departing tendency of local Song Sparrows, mostly juveniles, during the last ten days of August, is offered by the following figures:

TABLE V

| | *Number banded to Aug. 21* | *Number repeating after Sept. 1* |
|---|---|---|
| 1929 | 107 | 20 |
| 1930 | 106 | 7 |
| 1931 | 123 | 8 |

The rapid drop in Song Sparrow abundance during this period, as indicated by monthly trappings, and the increase in October caused by the migrating waves, is graphically shown in the accompanying chart.

Returning Chipping Sparrows have shown marked fluctuations in the three-year period, as shown in the accompanying table. Of the 72 birds banded in 1927, none returned the

*Caught in barn by neighbor and released.
† June 4 killed in trap.

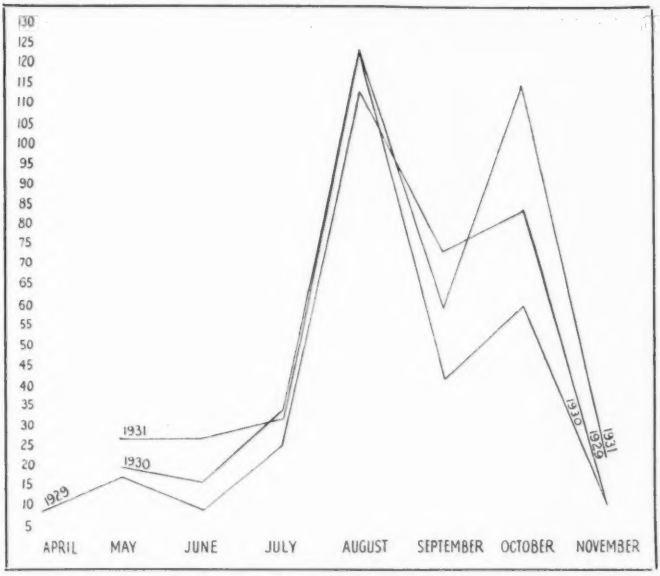


Figure 2. Song Sparrow Abundance at Five Oaks Farm, Groton, Massachusetts, as shown by the Number Trapped in the Years 1929, 1930 and 1931.

following year, and only two in 1929. On the other hand, of the 81 banded in 1928, 10 returned in 1929, (all trapped in May). Then apparently unfavorable conditions were experienced, for in 1930 only one of these ten returned, and of the 67 birds banded in 1929 but one returned. Nevertheless, in 1931 seven birds returned out of the 74 banded in 1930, indicating a quick recovery which at this writing seems to have continued into 1932. It may be mentioned parenthetically that the difficulty of trapping Chippies in the late summer and early fall, and the frequent finding of flocks in patches of crabgrass (*Eleusine indica*), led to the use of the seed of this grass for bait. While this did not bring in large numbers of birds, there is reason to believe that it did make possible the taking of many which would probably not have been trapped otherwise. In the following table of returning Chipping Sparrows, no attempt has been made to figure returning percentages, since it seems probable that a large proportion of the birds banded, especially in spring, are migrants.

TABLE VI

RETURNING CHIPPING SPARROWS AT GROTON, MASS.

| | | *Returning Dates* | | | | |
|---|---|---|---|---|---|---|
| | *Date Banded* | 1927 | 1928 | 1929 | 1930 | 1931 |
| 80006 | May 14, 1926 | May 15 | May 10 | May 6 | | |
| B37867 | Sept. 3, 1927 | | | May 20 | | |
| B11419 | Sept. 20, 1927 | | | Aug. 23 | | |
| B37562 | May 13, 1928 | | | Apr. 26 | | |
| B46712 | May 21, 1928 | | | Apr. 27 | May 17 | |
| B37567 | May 15, 1928 | | | Apr. 29 | | |
| B37557 | May 11, 1928 | | | May 4 | | |
| B46709 | May 27, 1928 | | | May 8 | | |
| B37559 | May 13, 1928 | | | May 11 | | |
| B46724 | June 3, 1928 | | | May 15 | | |
| B46707 | May 27, 1928 | | | May 17 | | |
| B46719 | June 1, 1928 | | | May 19 | | |
| B61553 | Sept. 19, 1928 | | | May 19 | | May 12 |
| C32408 | Oct. 14, 1929 | | | | June 2 | May 21 |
| 37980 | May 7, 1929 | | | | | May 25 |
| C62665 | June 3, 1930 | | | | | May 8 |
| C97100 | Oct. 3, 1930 | | | | | May 10 |
| C62629 | May 12, 1930 | | | | | May 12 |
| C62635 | May 16, 1930 | | | | | May 14 |
| C62617 | May 7, 1930 | | | | | May 16 found dead |
| C71633 | July 28, 1930 | | | | | May 20 |
| C62652 | May 25, 1930 | | | | | May 28 |

In the case of the Purple Finches, which have shown a strong returning tendency, it is, I think, fair to assume that probably all the returns are local breeders. Out of the 22 listed in the attached table, 16 are practically certainly such, as demonstrated by the late dates on which they have been taken as repeats, and one other is probably in the same class. In the cases of the seven which either failed to repeat or else repeated only a short time, the chances are that they either nested near by but beyond easy reach of the traps, or else met with some mishap. In the case of this species, but one return has been taken which was a juvenile when banded, and this bird was not taken as a return until July 10th of the year following banding. The Purple Finch in this locality differs markedly from the Song Sparrow and other common species in that very few juveniles are trapped and the bulk of the birds appear to leave soon after the nesting season; at any rate few of any age or either sex are taken after June, and almost none after July. The failure to take more juveniles as returns is probably due to the fact that so few are banded, and does not therefore indicate that juveniles do not return to their place of birth. My failure to take Purple Finches in late summer seems to be in marked contrast to the experience of other banders at no great distance from my station, and is not easy to explain.

TABLE VII

RETURNING PURPLE FINCHES AT GROTON, MASS.

| | | *Returning Dates* | | | | |
|---|---|---|---|---|---|---|
| | *Date Banded* | 1927 | 1928 | 1929 | 1930 | 1931 |
| A181163 | May 13, 1926 | | | May 10 | | |
| B46710 | May 27, 1928 | | | Apr. 30 | July 6 | |
| B37585 | May 19, 1928 | | | May 8 | | |
| B37595 | May 21, 1928 | | | May 8 | | |
| B37572 | May 16, 1928 | | | May 10 | | |
| B46723 | June 3, 1928 | | | May 10 | | |
| 37953 | May 2, 1929 | | | | Apr. 30, dead | |
| 37901 | Apr. 27, 1929 | | | | May 3 | |
| 37929 | Apr. 30, 1929 | | | | May 3 | May 9 |
| 37956 | May 3, 1929 | | | | May 5 | |
| B86001 | May 10, 1929 | | | | May 5 | |
| 37931 | Apr. 30, 1929 | | | | May 7 | May 6 |
| B86057 | May 25, 1929 | | | | June 17 | |
| B32801 | June 29, 1929 | | | | June 17 | June 9 |
| B32835 | July 27, 1929 | | | | June 17 | |
| B86099 | June 29, 1929 | | | | June 18 | |
| B86095 | June 28, 1929 | | | | July 10 | |
| B86004 | May 11, 1929 | | | | | June 28 |
| C62615 | May 7, 1930 | | | | | May 7 |
| C62673 | June 16, 1930 | | | | | May 10 |
| C62634 | May 16, 1930 | | | | | May 13 |
| C62602 | May 4, 1930 | | | | | Aug. 4 |

Returns of other species which are local nesters have, during the three-year period, been as follows:

| | |
|---|---|
| Catbird | 4 |
| Redstart | 2 |
| Vesper Sparrow | 2 |
| Red-winged Blackbrid | 1 |
| Cowbird | 1 |
| Blue Jay | 1 |

The only wintering species returning to this Station has been the Tree Sparrow. The table herewith presented is further confirmatory evidence of the strong tendency of this species to return to the same wintering grounds year after year. The percentage of returns, however, is considerably lower than it was in the period covered by my previous article, being 13.07 per cent as compared with 20.43 per cent. Possibly the reason may have been a general decrease in numbers from some unexplained cause. This is indicated by the fact that in 1928, 53 birds were banded, in 1929, 70, and in 1930 only 30. The percentage of returns fell off abruptly, being 24.53 per cent from the 1928 bandings, 7.14 per cent from the 1929 bandings, and 6.66 per cent from those of 1930. These figures indicate that something probably happened during the nesting season

of 1930 which greatly reduced the numbers of Tree Sparrows, and that they did not recover during the season of 1931. This theory is further borne out by the fact that only 23 Tree Sparrows were banded in 1931. It will be noted that the two birds at the beginning of the table lived to be approximately 6½ years old at least, and the third nearly 6 years.

TABLE VIII

RETURNING TREE SPARROWS AT GROTON, MASS.

| | | *Returning Dates* | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | *Date banded* | 1925 | 1926 | 1927 | 1928 | 1929 | 1930 | 1931 |
| A12114 | Dec. 23, 1924 | Nov. 30 | | Dec. 7 | Dec. 8 | Nov. 21 | Nov. 27 | |
| A12103 | Dec. 15, 1924 | | | Dec. 15 | Dec. 11 | Nov. 5 | Nov. 18 | |
| A12117 | Apr. 6, 1925 | Nov. 5 | May 2 | | | Nov. 5 | May 2 | |
| A70211 | Dec. 7, 1926 | | | Dec. 17 | Nov. 29 | Apr. 25<br>Nov. 9<br>Nov. 25—killed | | |
| A18606 | Dec. 15, 1927 | | | | Nov. 30 | Nov. 9 | Nov. 29 | |
| A18591 | Dec. 2, 1927 | | | | Nov. 15 | Nov. 12 | | |
| A18610 | Dec. 17, 1927 | | | | | Nov. 20 | | |
| A18617 | Dec. 20, 1927 | | | | Dec. 10 | Nov. 24 | | |
| A18619 | Dec. 21, 1927 | | | | | Nov. 22 | | |
| A18612 | Dec. 17, 1927 | | | | | Dec. 8 | | |
| A18596 | Dec. 7, 1927 | | | | Dec. 10 | Dec. 17 | | |
| B66935 | Dec. 10, 1928 | | | | | Nov. 7 | | |
| B66937 | Dec. 11, 1928 | | | | | Nov. 8 | | |
| B66895 | Nov. 16, 1928 | | | | | Nov. 8 | | |
| B66923 | Nov. 27, 1928 | | | | | Nov. 11 | | |
| B66934 | Dec. 10, 1928 | | | | | Nov. 12 | | |
| B66941 | Dec. 12, 1928 | | | | | | | Dec. 3 |
| B66948 | Dec. 27, 1928 | | | | | Nov. 12 | | |
| B66932 | Dec. 7, 1928 | | | | | Nov. 19 | Nov. 28 | |
| B66888 | Nov. 14, 1928 | | | | | Nov. 21 | Nov. 29 | Nov. 17 |
| B66929 | Dec. 6, 1928 | | | | | Dec. 4 | | |
| B66946 | Dec. 20, 1928 | | | | | Dec. 11 | | |
| B66925 | Nov. 30, 1928 | | | | | Dec. 11 | | |
| B66938 | Dec. 12, 1928 | | | | | Dec. 13 | | |
| C32516 | Nov. 25, 1929 | | | | | | Nov. 15 | |
| C32461 | Nov. 5, 1929 | | | | | | Nov. 26 | |
| C32524 | Dec. 8, 1929 | | | | | | Nov. 27 | |
| C32525 | Dec. 9, 1929 | | | | | | Nov. 27 | |
| C32529 | Dec. 14, 1929 | | | | | | Dec. 14 | Nov. 19 |
| F22633 | Dec. 7, 1930 | | | | | | | Nov. 28 |
| F22641 | Dec. 12, 1930 | | | | | | | Nov. 30 |

The species added to those listed in my former article as having been banded up through 1928 are:

| | |
|---|---|
| *Cuckoo | Magnolia Warbler |
| *Kingbird | Bay-breasted Warbler |
| Yellow-bellied Flycatcher | Northern Water-Thrush |
| Alder Flycatcher | Red-winged Blackbird |
| Red-breasted Nuthatch | Orchard Oriole |
| Winter Wren | *Scarlet Tanager |
| Veery | Rose-breasted Grosbeak |
| Starling | Evening Grosbeak |
| Red-eyed Vireo | Goldfinch |
| Tennessee Warbler | Grasshopper Sparrow |

making a total of 80 species banded at this station. In the above supplementary list, all except the ones marked with an asterisk were caught in traps.

### Notes on Bird Parasites

Though incomplete, a record of the occurrence of parasites and of foot disease has been kept. A number of specimens of parasites were collected, and most of these were sent to the Bureau of Entomology, United States Department of Agriculture, for identification. An article dealing with parasites sent in by banders from various parts of the country has been prepared by Mr. Harold S. Peters, who has charge of this branch of investigations, and appears in this issue. Therefore no detailed summary of the results obtained at this station will be given here; a few scattered comments will suffice. In general the number of parasites noted, with the exception of the *Protocalliphora* and *Hippoboscid* flies, has been much smaller than that noted at my station at Summerville, South Carolina. Thus, in the three years under consideration 30 individuals of eleven species of birds have been noted as having ticks, 10 individuals of five species as having lice or eggs of lice, 11 individuals of six species as having chigger mites, one scaly leg mites, and one a flea. The number of birds actually infested with these parasites was undoubtedly greater than these figures would indicate. As regards *Hippoboscid* flies, 141 individuals of twelve species were noted as infested.

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## NOTES ON THE NESTING OF BLUEBIRDS[1]

By Seth H. Low

The 1932 nesting season of the Bluebirds (*Sialia s. sialis*) on Cape Cod was so exceptionally successful that it deserves comment. The material on which these notes are based was gathered casually during the study of the nesting of the Tree Swallows. The territory, boxes, and conditions are the same as those described in the articles on the Tree Swallow.[2]

In 1930 ten nestling Bluebirds were banded, three in a tar-paper box at the Station and seven in holes in fence-posts near the North Eastham railroad station, which is about one and a half miles to the southeast. One adult was taken in a box; another was trapped at the Station.

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[1]Contribution No. 13 from the Austin Ornithological Research Station.
[2]Notes on the Breeding of the Tree Swallow by O. L. Austin and S. H. Low, *Bird-Banding*, Vol. III, No. 2, April, 1932, and an article in this issue, *ante*, page 76.

In 1931 both species were offered 98 wooden and 30 tar-paper boxes. The Tree Swallows, always victorious in any dispute with Bluebirds, took 60 of these. Although many houses were not utilized there were but six nests of Bluebirds. Of these, two, which contained full clutches of eggs, were deserted. The others produced seventeen young, all but one of which were banded. Only two adults were taken in the boxes, but six more were caught in traps and nets. There were other nests in natural sites, but from them only one young and one adult were obtained.

This past season 430 wooden and two dozen tar-paper boxes were erected on the Station grounds and 70 elsewhere, as described in the foregoing article. On making the first inspection of the boxes, May 14th, I was surprised to find six broods of young Bluebirds. These, however, were not the earliest broods, for a box five and a half miles to the north contained four nestlings two or three days old on May 5th.

On the Station grounds there were twenty nests of Bluebirds. Since the study of this species was a secondary matter, no particular effort was made to trap the adults owning these nests. However, one pair is known to have raised two broods. The first, consisting of five birds, hatched out May 14th and left the nest about the end of May. By June 28th the same parents had completed a clutch of four eggs in a box five hundred feet north of their first nest. Three young left this nest about the 27th of July.

In another case a male had two consecutive broods, each with a different female. The first brood flew about the last of May; the second hatched July 24th. Incidentally, the second nest was built on top of one used previously by Tree Swallows, which late in June had contained two young swallows. Both of these died, one while very young, the other when nearly full grown; and these I removed. A short time later the Bluebirds lined the dirty nest with grass and raised a successful brood.

Three more second broods were traced through females. In two instances the male in the first box was not captured; in the third instance the male of the second brood was not caught. One female had young late in May and again late in July. The other two pairs had completed the laying of second clutches two weeks after their first broods had flown.

A sixth second brood is traceable through a male, although the female of the first brood was not identified. In all six instances the second broods were raised in boxes in close proximity to the first ones.

In contrast to the high mortality of nestling Tree Swallows, that of the young Bluebirds was negligible. The following figures are not unquestionably exact, for some of the nests were not visited until they already contained young. Hence, in the absence of any evidence to the contrary, it is assumed that there were no more eggs laid than there were young and sterile eggs found at the time of discovery. The season's results may then be summed up as follows:

A total of 139 eggs were laid in 31 nests. Not one nest was deserted, and only one (it contained but a single egg) was destroyed. The hatching of 130 eggs constituted 93.5 per cent of the total laid. But one entire brood died, and that from an undetermined cause. It is noteworthy that *Protocalliphora* were not found in the nests. Five young disappeared between the time of hatching and the time of banding. Although only one dead bird was found, it is believed that the missing nestlings must have died or been killed and carried off. The total mortality was but ten, or 7.7 per cent of the hatch. Allowing for the possible errors, the reproductive efficiency of the Bluebirds was approximately 85 per cent.

Although little was done in the way of watching the nesting habits and the boxes were visited too infrequently to determine accurately the duration of the periods of incubation and adolescence, the former appeared to be from thirteen to fifteen days, the latter fifteen to nineteen days.

Only three Bluebirds of the thirty-eight banded in 1930 and 1931 returned. The only adult banded in 1930, a female, returned in 1931, to breed again about a mile from its first site. One male and a female of the adults captured in traps in 1931 nested this season in the boxes at the Station. The only recovery has been one of the 1931 nestlings. This bird left its nest June 30th; repeated in a trap a mile away on August 23d, and was "found dead" at Merry Hill, North Carolina, by V. H. Lee on December 18, 1931.

North Eastham, Cape Cod, Mass.

## GENERAL NOTES

**Starling-Banding in Central Ohio During 1932.**—A total of 10,645 Starlings have been banded in the Columbus region from 1927 to January 1, 1933, by the cooperative efforts of various members of the Wheaton Club. A few birds have been captured during each month of the year, but all of the large bandings have been during four months—March, 4901; February, 2336; December, 1792; and January, 1568. Totals for years were as follows: 1927, 948; 1928, 1322; 1929, 4813; 1930, 449; 1931, 0; 1932, 3113. These bandings were by bands issued to Edward S. Thomas, Lawrence E. Hicks, George Wolfram, Roscoe W. Franks, William Ireland, Floyd B. Chapman, and C. Conklin. Mr. Thomas has summarized and presented the returns and other data obtained from the 1927–1930 bandings.

The banding work, after being dropped in 1931, has been resumed again to collaborate results of the early bandings, to obtain additional data on migration habits, to attempt to solve a long list of still perplexing problems, and to make specific studies of the behavior and physiology of the species. In 1932 a total of 3113 new bands were placed by the writer with the assistance of William Ireland, Floyd B. Chapman, and Walter Fassig.

Because of the extremely mild weather, it was impossible to band any Starlings during the winter of 1931–1932 until after the sudden cold snap in March. This cold weather concentrated the birds which were in our territory and delayed the migration for about twenty days after the usual date for the disappearance of flocking birds. An attempt was made to band as many as possible of the late migrants, ten bandings during the latter part of March yielding 1474 birds.

During December 1932 seven bandings in Franklin and Delaware counties totaled 1584 birds. Of these, 106 or nearly 7 per cent, repeated during the month. The percentages of returns at six bandings in December were 9, 6, 10, 10, 10, and 3. A total of 122, or 7.7 per cent of the birds banded in March, 1932, returned in December, 1932. Also returns were secured of 8 birds banded in early 1929. The percentage of recovery of Starlings from distant points is surprisingly low, usually being about 2 or 3 per cent.

It is hoped that several thousand more Starlings can be trapped during the first three months of 1933. About 60 adults and nestlings have been banded during the summer season, but it is necessary to band at least a thousand more to solve questions concerning our breeding population. The value of the banding work would be greatly increased if twenty-five banders in Ohio and the adjacent States could be induced to take up the work. Starling-banding becomes increasingly fascinating as the study progresses and gives one the exceptional opportunity of being able to follow the travels of an introduced migratory species. Frequently Starlings can be easily captured in numbers at night where they congregate in the towers of buildings or in cupolas of barns. The writer would be pleased to hear from other banders interested in working with this species.—LAWRENCE E. HICKS, Department of Botany, Ohio State University, Columbus, Ohio.

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**Banding Provides the First Certain Record of the Eurasian Pintail (*Dafila acuta acuta L.*) in North America.**—About May 1, 1932, Mr. Samuel Hobbs, of Bradore Bay, Saguenay County, Quebec, shot, on a pond on the mainland near Bradore Bay, a male Pintail which bore a band inscribed as follows: "P. Skovgaard, Viborg, Danmark, V, 4720." The duck was plucked and eaten, but the band was saved and was shown to me in July, 1932, at which time I copied the inscription directly from it. Bradore Bay is situated on the north shore of the Gulf of St. Lawrence,

near the western end of the Strait of Belle Isle and the eastern boundary of Canada. In reply to inquiry Mr. Skovgaard has kindly stated that this band was placed on a young Pintail at Adaldal, near Husavik, in northern Iceland, on June 30, 1930. This record appears to supply the first certain evidence of the occurrence of *Dafila acuta acuta* in North America and so provides a basis for the addition of that subspecies to the A. O. U. "Check-List."—HARRISON F. LEWIS.

**Nesting White-throated Sparrow Returns.**—The White-throated Sparrow nests commonly about my station. Thirty-two birds of this species were banded by me during the season of 1931, five of which returned this season. Following is the record of these birds:

A 191428—Banded June 25, 1931. Repeated Aug. 25.
Returned May 4, 1932. Repeated May 9, 15, 20, 24, and July 5, 20, 23.
B 169666—Banded Aug. 23, 1931.
Returned April 30, 1932.
B 169672—Banded Aug. 31, 1931.
Returned June 17, 1932. Repeated July 8.
B 169676—Banded Sept. 2, 1931. Repeated Sept. 3, 21.
Returned July 6, 1932.
B 169681—Banded Sept. 9, 1931.
Returned May 4, 1932. Repeated May 5, 9, 11, 18.

These birds were all banded as adults. I feel that it is reasonable to conclude from the above data that at least some of these birds nested in the vicinity of my station.—BYRON W. MCPHETERS, Pine Street, Bar Harbor, Maine.

**Returns of Banded Purple Martins.**—During the four years 1925–1928 the writer banded a number of Purple Martins (*Progne subis subis*) which nested in a 10-room martin-house at Fredericktown, Ohio. As probably none of these are still living and as several results of interest have been obtained, a brief report is now made.

A total of 36 Martins were banded, including 16 adults and 20 nestlings, by operating string hinge traps placed at the entrance of each nesting compartment. The openings were sufficiently large to permit ready capture of the adults without interference with nesting activities. Adults were retrapped repeatedly (during experiments several females were captured ten or twelve times daily) without any great disturbance which might result in desertion. The males, however, became timid after repeated trapping.

Fifteen adult birds repeated 96 times. Five were taken as returns in the same house one or two years after banding, and two distant recoveries were recorded. A female, 346412, was banded at Fredericktown on June 13, 1926, and repeated fourteen times at the nest-box between June 13th and July 28th, successfully rearing a brood of four young. This bird was found dead by D. H. Gerwick, Martinsburg Road, Mt. Vernon, Ohio, on June 5, 1927, ten miles from the place of banding. The bird was apparently nesting at the martin-house at that place.

A male, 72541, was banded at Fredericktown on May 5, 1925, and repeated eight times from May 5th to July 7th, raising three young. In 1926 this bird nested in the same room as the previous year, again raising three young and repeating twelve times from April 29th to July 8th. On May 5, 1927, during a severe storm the bird was found with a broken wing at Hillsboro, Ohio, by Clyde L. Strofe, a distance of about one hundred and twenty-five miles from the point of banding. The date would appear

to be evidence of nesting at Hillsboro. These two records would seem to indicate that Purple Martins may nest in one locality for one or more years and then establish a summer residence in a new and distant locality.

Martin 72547 was one of four nestlings banded on July 18, 1925. It left the nest on July 25th but returned and was captured daily until August 2d. In 1926 this bird returned as an adult male and mated with female 346492, nesting in the same room of the martin-house in which it was caught as a nestling in 1925. It was very timid, but was trapped on July 18, 1925, and several times thereafter until its young died in the nest. Of several hundred nestlings banded by the writer of various species this is the only individual known to have returned to nest in the locality where it was raised. None of the other banded nestlings have returned to martin-houses in the vicinity, this one instance probably representing a very exceptional case.

Male 72546, banded on June 13, 1926, returned on April 28, 1927, but did not nest. Female 410136, banded on June 13, 1926, was mated with male 346419 during that year but returned in 1927 and mated with male 194132. Male 194137, banded on June 23, 1927, was mated with female 194138, but returned in 1928 and mated with female 629201. Male 440137, banded on June 13, 1926, was mated that year with female 346412 (which returned from Mt. Vernon, Ohio, in 1927) but returned in 1927 and mated with female 194131.

These three returns would seem to indicate that Martins seldom, if ever, have the same mates on successive years. This habit may be related to the migratory movements which tend to separate the sexes, or to the short life-span of the species, and may account for the known shifting of two birds to new nesting localities as related above. The opportunities for detailed, intensive work close at home with this species and the unusually large percentage of returns from this one station, would seem to recommend the Purple Martin as a bird worthy of more attention in intensive, continuous banding studies.—Lawrence E. Hicks, Department of Botany, Ohio State University, Columbus, Ohio.

**Some Complicated Bluebird Family History.**—At Pomfret, Connecticut, during May, 1932, Bluebirds B128957(♂) and B135555(♀), both wearing red bands, were mated and raised a brood of four young that left the nest on May 28th. About ten days later they built a second nest in the same box and eggs were laid. At this same time, Bluebird B176225(♀), nesting about eight hundred feet distant, lost her unbanded mate either by death or desertion, and on June 11th, B128957(♂), whose mate was laying eggs for their second brood, was seen making love to and feeding the five half-grown young of B176225(♀). For a few days he was back and forth from one mate to the other, then, as his first mate was sitting, he apparently forgot her and spent all of his time with B176225(♀). The young birds by his first mate were now beginning to care for themselves, and his step-children were under his protection until July 12th. His first mate, B135555, was left to bring up their second brood alone. It proved too great a task, and on July 8th her half-grown fledglings were found dead in the nest. On the same date she (B135555) was found to have acquired a new mate B176426(♂), and they began to look over a new box.

About the middle of July a new unbanded female appeared, and B128957(♂), his second mate now sitting, and his step-children large enough to care for themselves, immediately fell in love with the new unbanded female. One morning B176225(♀) found her spouse B128957(♂)

with the new unbanded female and a desperate battle followed between the two females. However, B176225 was forced to go back to her eggs, and the unbanded female immediately began to build in a nesting-box about three hundred feet from the nesting-box of B176225, and by July 26th had laid five eggs. The ambitious male spent the greater part of his time with the unbanded female until the young birds of B176225(♀) were hatched, then the unbanded female began brooding her eggs, and he spent practically all of his time caring for the young of B176225. One of these young left the nest on August 3d, and the rest of the full-grown young were found dead in the nesting-box. The parents, B128957 (♂) and B176225(♀), wandered away and were not seen again. At the same time the unbanded female abandoned her eggs.—Mrs. Kenneth B. Wetherbee.

**Nelson's Sparrow and Tree Swallow Wintering in New Jersey.**—On December 21, 1932, at Leed's Point, about six miles northwest of Atlantic City, New Jersey, I observed three Nelson's Sparrows (*Ammospiza c. nelsoni*) and was able to collect one. These were associating with the Sharp-tailed Sparrows (*A.c. caudacuta*), which were common in the salt marshes. At that time the bays were frozen over, and about ten inches of snow covered the ground. Consequently these birds were feeding along the banks of drains and sloughs where running water prevented much accumulation of ice and snow. Dr. Witmer Stone in his *Birds of New Jersey*, page 233, states that the Nelson's Sparrow is a "rather scarce transient visitant" in the State, having been taken in May and October, 1892, near Atlantic City.

At this same locality and on the same day I also observed two Tree Swallows (*Iridoprocne bicolor*) flying hurriedly back and forth over the frozen ground. They undoubtedly were subsisting largely on a vegetable diet, as their insect fare during such a cold spell surely must have been reduced to the minimum.—Clarence Cottam, U. S. Biological Survey, Washington, D. C.

**Banding of a Brünnich's Murre at Wells River, Vermont.**—On Dec. 9, 1932, I found a Brünnich's Murre (*Uria l. lomvia*) in a field some distance from water. The bird was quite active and managed to make fair progress, chiefly by the use of its wings, and as it was expert in doubling and turning, some difficulty was experienced in its capture, but this was accomplished by throwing my coat over it. Band 210031 was attached and it was released in the Connecticut River. The bird showed evident satisfaction over again being in its native element, frequently dipping its bill and often rolling on its side. As soon as the current of mid-stream was felt, the bird turned facing it and floated downstream backward. It was last seen at a distance of more than one mile from the place of release.—Wendell P. Smith, Wells River, Vermont, December 12, 1932.

**A Chickadee Recovery.**—*Bird-Banding* has furnished surprisingly few notes on the migration of the Chickadee, so I am glad to chronicle a case of this kind recently reported by the Biological Survey. On October 7, 1932, I banded a bird of this species at my station in Amherst, Massachusetts. Mr. N. G. Purcell reports that a Persian kitten brought the bird to his house in Belvidere, New Jersey, some two hundred miles southwesterly from my station, on December 24, 1932.—Mrs. Frederick Morse Cutler.

**Three Tree Swallows Feed a Family of Nestlings.**—Tree Swallow B84071(A), a return-3, has nested for four consecutive years in the same box at my home in Worcester, Massachusetts. He was mated to F62139 in 1932. On June 15th their four young were banded, F62177, F62178, F62179, and F62180. On this date both adults and an additional adult Tree Swallow, F62176, were taken in the same nesting-box. They were watched for several days, and all three adults brought food to the young. Mr. Forbush says, "Occasionally three birds, usually two males and one female, engage in preparing a nest, incubating the eggs and feeding the young," but this is the first instance of this sort of thing among my Tree Swallows.—Mrs. Kenneth B. Wetherbee.

**Notes on Barn Swallows.**—Last summer I banded 137 juvenile Barn Swallows in a loft in my barn. About August 1st, when the first brood was well able to fly, I found from ten to twenty birds every morning, usually between 9 and 11 o'clock, resting on a rope under the loft. It was possible to drive many of these into the loft and band them, and I was surprised to find that there was a different lot of birds in the barn each day for there were very few repeats. It seems evident from this experience that young Barn Swallows move about the country before they actually start migrating, and that they have a habit of congregating in any convenient barn early in the morning. It is entirely likely that some of these birds may have been reared in my barn, for I did not band any of the first brood as nestlings, but there were not over ten nests in the barn, so that all I caught could not have been raised there. In any case, supposing this was the home barn for some of the birds, they showed by rarely repeating that the tendency to wander is probably their regular, and not their exceptional, behavior. —Edward M. Davis, Shirley, Massachusetts.

## RECENT LITERATURE

**Physiology of the Temperature of Birds.**—by S. Prentiss Baldwin and S. Charles Kendeigh. Scientific Publications of the Cleveland Museum of Natural History. Vol. III, pp. I-X; 1–196: Frontispiece: pls. I-V; figs. 1–41. Issued, October 15, 1932. Cleveland, Ohio. This book presents the results of the careful studies on the temperature of birds which have been done at the Baldwin Bird Research Laboratory, Gates Mills, Ohio.

Most of the observations were made on the House Wren (*Troglodytes aëdon aëdon*), yet a considerable amount of data obtained on other species is included. The principal method used for measuring the temperatures was by means of thermocouples attached to a recording potentiometer.

The average "standard temperature" for the male House Wren was found to be 104.4° F. (40.2° C.) and that of the female 105.5° F. (40.6° C.). There was a daily variation in the body temperature of eight species of female passeriform birds on the nest incubating varying from 103.4° F. (39.7° C.) to 108.7° F. (42.6° C.). Muscular activity, emotional excitement, and food caused a rise in body temperature, while during inactivity, as for example sitting on eggs, there was a fall. The highest normal record for a bird held in the hand was 113.5° F. (45.3° C.) for a female Robin.

The upper range for the lethal temperature of adult House Wrens averaged 116.3° F. (46.8° C.) and 115.9° F. (46.6° C.) for nestlings. The lower lethal temperature for adults was 71° F. (21.7° C.) and for nestlings 47° F. (8.3° C.).

The nestling Wren is a cold-blooded animal, its temperature varying with the surrounding atmosphere until its heat-regulating mechanism begins to function at about nine days of age. The greatest variation in the temperature of a nestling was a drop from 107° F. to 88° F. in 16 minutes.

House Wren embryos were found to be able to withstand temperature fluctuations from 32.0° F. (0° C.) to 114.0° F. (45.6° C.). The temperature of Wrens' eggs was found to fluctuate between 98.5° F. (37.0° C.) during brooding to 93.1° F. (34.0° C.) when the bird was off the nest.

This monograph is well illustrated with photographs and curves, and it contains a vast amount of useful information for other workers in this field.—L. B. Nice.

**Banding in Switzerland.** The report[1] for 1930 of the *Vogelwarte* at Sempach is full of interest. Forty-seven coöperators banded 8639 birds, J. Bussmann heading the list with over nine hundred birds to his credit. There are several records as to age: 4 years since banding, Tree Sparrow (*Passer montanus*), and Blue Titmouse (*Parus cæruleus*); 5 years, Chaffinch (*Fringilla cælebs*); 7 years, Yellowhammer (*Emberiza citronella*); and 7 and 8 years, Alpine Swifts (*Apus melba melba*), the last birds banded in the nest and returning to breed in their birthplace. This was also true with Starlings (*Sturnus vulgaris*) and Black-headed Gulls (*Larus ridibundus*), a juvenile of the latter banded in 1927 being found dead in the same colony in 1930. Great Tits (*Parus major*) banded as nestlings are found to breed in near-by boxes, while a female of this species nested three years in the same box.

Great Tits are predominantly stationary, but one banded as a juvenile in 1927 was taken forty miles west on October 30, 1930, while another, banded as an adult May 12, 1929, was found December 1, 1930, two hundred miles south. The same situation holds true with the Blue Titmouse, only one recovery having been made at a distance, *viz.* a juvenile banded May, 1930, and taken two hundred and fifty miles southwest October 22, 1930. A wintering Black-headed Gull banded December 15, 1925, was found eighteen miles south on January 18, 1930, while another banded in July in 1930 in Petrograd was taken November 17, 1930, in Switzerland. The long journey to the north undertaken by young Starlings is shown by the record of a bird banded as a juvenile May 12, 1930, and recovered one hundred and seventy miles north June 25, 1930, while another banded as a juvenile May 14, 1928, was taken one hundred and eighty miles northeast October 19, 1930.—M. M. N.

**Aquila, 36-37. 1929 and 1930.**—A very interesting report of banding results from Hungary is given by Jakob Schenk; a symbol shows whether a bird was banded as a nestling or adult, while the direction and distance of the place of recovery from that of banding are given. With the Swallow (*Hirundo rustica rustica*) there have been nearly five hundred cases of return to home in both old and young, with only two exceptions in the breeding season. Lapwings (*Vanellus vanellus*) have been taken 2, 3, 4, 5, and 7 years after banding. A Black-tailed Godwit (*Limosa limosa*), an adult banded on the nest in 1913, was killed in Algeria, March 11, 1929, one thousand miles southwest.

Koloman Warga reports on the weights of male Quail (*Coturnix coturnix*) captured from May 8th to July 12th, 1930 in Hungary; these varied from

[1] A. Schifferli. Bericht der Schweizerischen Vogelwarte Sempach. (1930). Der Ornithologische Beobachter. February, 1932, Vol. 29, pp. 66–84.

52 to 112 grams, the author explaining the great fluctuations by the fact that it was the courting season. One bird caught June 27th weighed 86 grams; on July 4th he was found ten miles southwest and weighed 72 grams.

Titus Csörgey tells of "the gradual dying-out of the migratory instinct in the Blackbird" (*Turdus merula*) "which in the last forty years has changed into a resident, even the young passing the winter with us" (p. 229). Apple orchards have been saved from insect pests by the installation of nest-boxes for Titmice, although constant warfare has to be waged against both House Sparrows (*Passer domesticus*) and Tree Sparrows (*Passer montanus*) in the matter of these same boxes.

A remarkable record of all-day feeding is given by Hans Salmen in the case of the Redstart (*Phœnicurus phœnicurus*) (pp. 127–128); the female did all the feeding, bringing 419 meals to her six young the day they were thirteen days old, an average of once every two minutes, nineteen seconds. (The author does not mention why the male did not assist.) The rate increased till noon, 46 meals being given from 12 to 1, but decreased during the heat of afternoon and a thunderstorm.—M. M. N.

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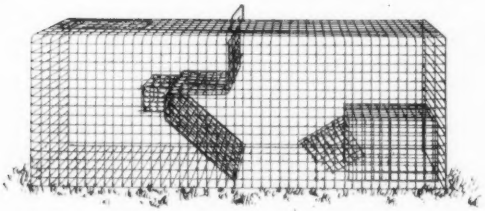

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